2005

Ecology of the Missouri River. Progress Report, Dingell-Johnson Project F-75-R-23, Supplement I - Missouri River Creel Survey, Bellevue to Camp Creek, 2 April through 14 October 2005

Gerald Mestl
Nebraska Game and Parks Commission, gerald.mestl@nebraska.gov

Ecology of the Missouri River

Missouri River Creel Survey

Bellevue Bridge to Camp Creek

2 April through 14 October 2005

Supplement I

Federal Aid in Sport Fish Restoration

Dingell-Johnson / Wallop-Breaux Project

F-75-R-23

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Gerald Mestl

Fisheries Division

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Abstract

This report describes Missouri River activities and results related to a channelized Missouri River creel survey conducted from 2 April through 14 October 2005. This is the sixth of a planned annual creel survey to be conducted on alternating sections of the channelized Missouri River to measure changes in recreational fishing activity, especially those changes due to large scale habitat restoration efforts. We returned to the Bellevue to Camp Creek reach in 2005 because we had to cancel the creel on this reach in 2004 after the second creel period due to lack of personnel. Future reports will contain additional analyses of these data.

Only one creel was conducted during the first creel period because of lack of personnel. Anglers spent over 29,000 hours fishing the Missouri River from Bellevue (rkm 967.7) to Camp Creek (rkm 883.5) during the survey period. Effort remained relatively steady throughout the survey. The Plattsmouth and Nebraska City segments accounted for over 63% of the effort. Anglers targeted catfish (blue, channel and flatheads) over 51% of the time that they were fishing. Inside bends were the most commonly fished macrohabitat, accounting for over 52% of the total angling effort.

Anglers caught over 7,800 and harvested over 7,800 fish from 2 April through 14 October 2005 while fishing the Missouri River. Catch was spread out through the year but anglers fishing the Plattsmouth and Nebraska City reaches caught over 61% of the fish. Total catch rates ranged from 0.17 fish per hour during the third (5/28 - 6/24) and fifth (7/23 - 8/19) creel period to 0.34 fish per hour during the second creel period (4/30 - 5/27). Flathead catfish were the most abundant species in the creel followed by freshwater drum, channel catfish and shovelnose sturgeon.

Keywords: Missouri River, rivers, creel, survey, fish, fishing, anglers, recreation, shovelnose sturgeon, common carp, channel catfish, flathead catfish, freshwater drum, macrohabitat, microhabitat and bait.

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Performance Report

State: Nebraska Project Number: F-75-R-23

Project Type: Research

Study Title: Missouri River Ecology

The Nebraska Game and Parks Commission's strategic plan has stated the following management goal for the Missouri River: Restore, protect, and maintain the diversity of historic Missouri River habitats, resources, and ecosystem functions in order that present and future generations may enjoy consumptive and non-consumptive outdoor recreational opportunities (NGPC 1996). To accomplish this goal the Nebraska Game and Parks Commission identified the following five objectives:

- To restore terrestrial and aquatic floodplain habitat types by 2008. This would include old oxbows, chutes, side channels, sand bars, backwaters, wetlands, and other shallow water habitats.
- To restore flows that reflect the natural hydrograph of the Missouri River by the year 2008.
- To inform and educate the general public and constituency about Missouri River ecosystem functions and management.
- To double the number of total recreational use days by the year 2008.
- To investigate and manage native fish, wildlife, waterfowl, and furbearers on a sustainable basis.

Even though several of these objectives fall outside of NGPC management authority, this project has and will provide the data necessary to plan, implement and evaluate them. This strategic plan is currently being reviewed and updated.

Introduction

Creel surveys on large rivers with numerous public and private access points are difficult and expensive to design and conduct. The first creel survey conducted on the channelized Missouri River in Nebraska was a roving creel during 1972 to1973 (Groen 1973). Segments of the channelized river covered included, Sioux City to Blair, Blair to Nebraska City and Nebraska City to Rulo. These same segments were surveyed again in 1978 and 1979 (Hesse 1980). The Missouri Department of Conservation conducted a recreational use survey on the channelized Missouri River from the mouth to the Iowa-Missouri state line in four segments over a four year period from 1983 through 1987 (Fleener 1989). The segment adjacent to Nebraska was sampled in 1985 and 1986 and extended from the Iowa-Missouri state line downstream to St Joseph, Missouri. The present project examining several reaches of the channelized Missouri River had several objectives:

- Develop a creel survey design that when repeated over time would measure changes in recreational fishing activity and success and allow us to estimate the effects of large scale restoration efforts on recreational fishing.
- Estimate recreational fishing use.
- Estimate the number and species of fish harvested and released by recreational anglers.
- Estimate recreational fishing effort on public and private lands and by boating anglers using public and private boat ramps
- Correlate fishing effort and success with a combination of season, physical habitat variables (location, macrohabitat, microhabitat, water temperature and secchi disk transparency) and fishing methods (bait)
- Develop recreational fishing educational information based on survey results

Study Site

A roving creel was conducted on a 84.2 kilometer reach of the channelized Missouri River from the Bellevue Bridge (river kilometer (rkm) 967.7) downstream to Camp Creek (rkm 883.5) during 2005 (Figure 1). This reach was divided into five segments; Bellevue, Plattsmouth, Goose Island, Nebraska City, and Hamburg.

The Bellevue segment started at the Bellevue Bridge and ended above the mouth of the Platte River (rkm 957.2). This 10.5 km segment consists of four river bends: Upper Bellevue, Lower Bellevue, St. Mary's Cut-off, and Papillion. One tributary, Papio Creek, drains into this segment of the Missouri at rkm 960.2. Two private cabin developments are in this segment at rkm 964.6 - 963.7 and rkm 960.0 - 958.8. There is one public boat ramp, Hayworth Park, in Bellevue (rkm 967).

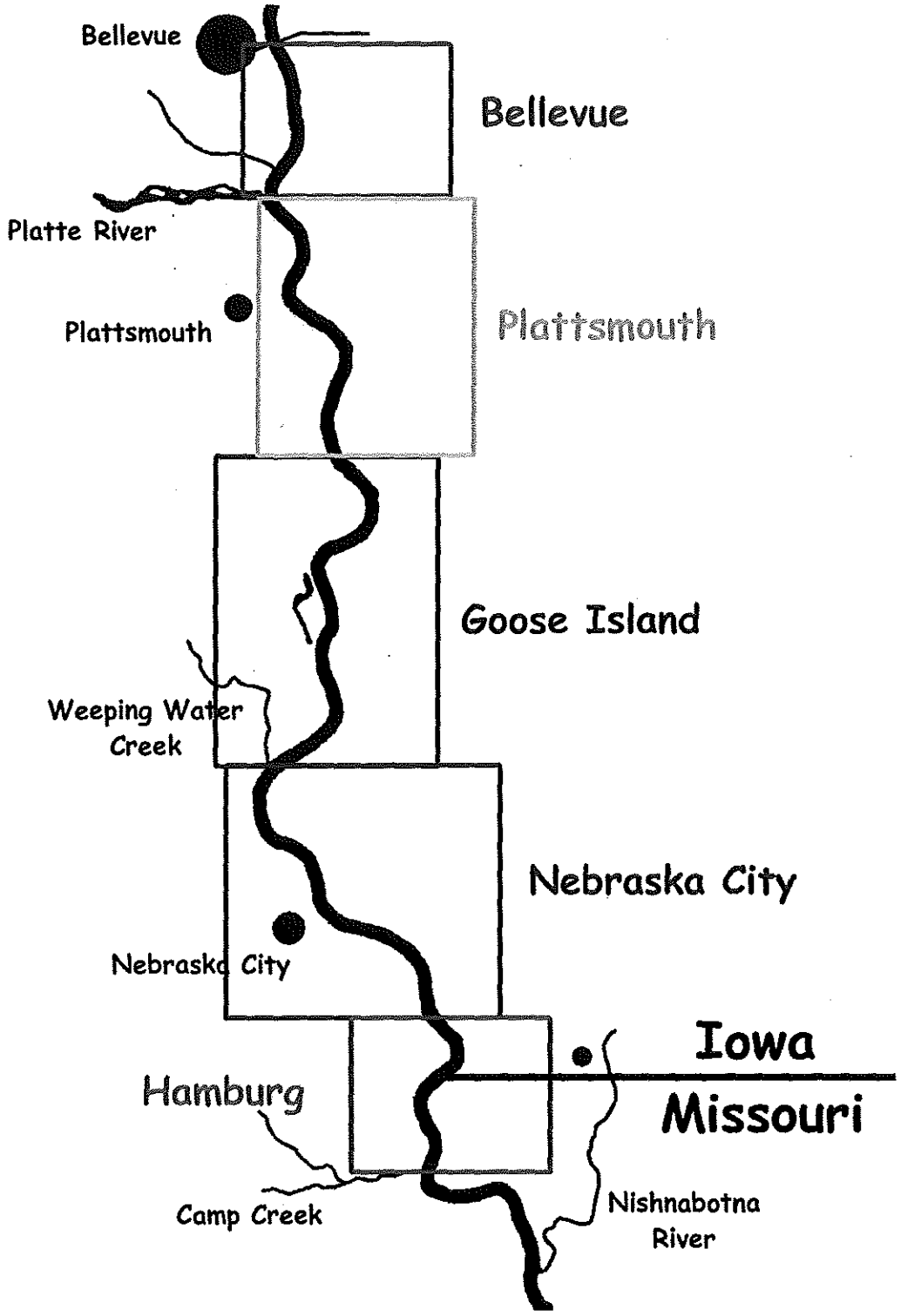
The Plattsmouth segment begins above the mouth of the Platte River and ends at the Rock Bluff elevators (rkm 940.7). This 16.5 kilometer segment consists of four bends: Upper Plattsmouth, Lower Plattsmouth, Tobacco and Rock Bluff. The Platte River (rkm 957.2) and Keg Creek (rkm 945.7) are the only tributaries in this segment. There is a public boat ramp near the city of Plattsmouth (rkm 951.9). This segment contains the Schilling Wildlife Management Area (WMA), 3.8 kilometers of publicly accessible river bank. Three private cabin developments occur at rkm 945.6 - 944.7, 949.8 - 949.0 and between the boat ramp and Schilling WMA at rkm 953.4 - 952.7.

The Goose Island segment begins at the Rock Bluff elevators and ends at the mouth of Weeping Water Creek (rkm 915.2). This 25.5 kilometer segment consists of five bends: Calumet-Barlett, Pin Hook, Van Horns, Lower Civil and Upper Civil. It has five tributaries: Rock Creek (rkm 940.2), Fremont Ditch (rkm 935.4), Waubonsie Ditch (rkm 933.4), Rakes Creek (rkm 929.7), and Plum Creek (rkm 922.3); plus one private cabin development and one public boat ramp (rkm 934.7).

The Nebraska City segment starts at the mouth of Weeping Water and ends at the O.P.P.D. Power Plant north of Hamburg Bend (rkm 895.1). This 20.1 kilometer segment consists of five bends: Upper Copeland, Lower Copeland, Nebraska, Frazers, and Otoe. There are three tributaries: Walnut Creek (rkm 908.9), North Table Creek (rkm 905.1), and South Table Creek (rkm 904.8); plus one private cabin development and one public boat ramp, Riverside Marina at Nebraska City (rkm 906.4).

The Hamburg segment starts at the O.P.P.D. Power Plant and ends at the mouth of Camp Creek (rkm 883.5). This 11.6 kilometer segment consists of three bends: Upper Hamburg, Lower Hamburg and Upper Barney and has one tributary, Camp Creek in Otoe County. There are no private cabin developments and one public boat ramp, Hamburg Bend Access at Hamburg, Iowa (rkm 892.4). There is also a restored chute, Hamburg Bend WMA, chute entrance rkm 894.3 and exit rkm 888.7.

Figure 1. Map showing sampling segments used during the creel survey on the Missouri River from the Bellevue Bridge to Camp Creek from 2 April through 14 October 2005.



Creel Survey Design

We used a roving creel design because of the large number of potential access points. An "instantaneous count" (2 hours downstream and 2.5 hours upstream) was obtained using a boat. Four weekend creel surveys and six weekday surveys were conducted during each four-week period. For each creel day a random count time and direction (either upriver or downriver) were chosen. One of four starting count times (0900, 1200, 1500 or 1800) was chosen randomly without replacement for a weekend count and one of six starting count times (0800, 1000, 1200, 1400, 1600 or 1800) was chosen at random without replacement for a weekday count. An example of a creel schedule for a creel period is presented in Table 1.

Creel clerks recorded the number of active boat and bank anglers and the number of boats involved in various recreational activities by segment (examples of the data forms used are presented in Appendix I). In addition, the clerks recorded information on air and water temperature, wind speed (categories), weather (categories), navigation conditions (categories) and the secchi disk transparency (cm).

During angler interviews all harvested fish were identified to species and measured to the nearest millimeter. Anglers were asked to identify released fish and estimate their length to the nearest inch. In addition, if an angler was fishing from the bank we identified whether they were fishing on public or private property or if fishing from a boat whether they used a public or private boat ramp. Trip information included the time the angler started fishing, the time of the interview, and if the fishing trip was complete or incomplete. Fishing information included the species the angler was seeking, fishing method, bait and if each angler had run setlines during the year. Additional information collected from each angler included gender, anglers state of residence and age.

Information was collected on the actual fishing location of each angler including segment, latitude and longitude, macrohabitat, microhabitat and structure. The river was divided into six macrohabitats some of which were further subdivided by location: inside bends (upper, middle and lower), outside bends (upper, middle and lower), secondary channel connected (upper, middle and lower), secondary channel non-connected and tributaries. The tributary macrohabitat included river and creek mouths and drainage ditches emptying into the river. Each of these six macrohabitats were further divided into microhabitats

(see figures in Appendix II) that identified where the angler was actually fishing.

Data Analysis

Data were entered into three tables in a Microsoft ACCESS database. The tables were exported from the database as ASCII text files. All data summarization and analysis was done with SAS statistical analysis software (Version 6.12 for Windows) (SAS Institute 1989).

Calculations of effort and catch, effort and catch variances and standard errors followed Pollock et al. 1994, pages 245 through 252. Hours and catch were both calculated by survey period, segment, and day type (weekend or weekday). Catch rate is the number of fish caught divided by the number of hours spent fishing.

Proportional Stock Density (PSD) is the proportion of fish of quality size in a stock (Gabelhouse 1984). Relative Stock Density (RSD) is the proportion of fish of a size group in a stock.

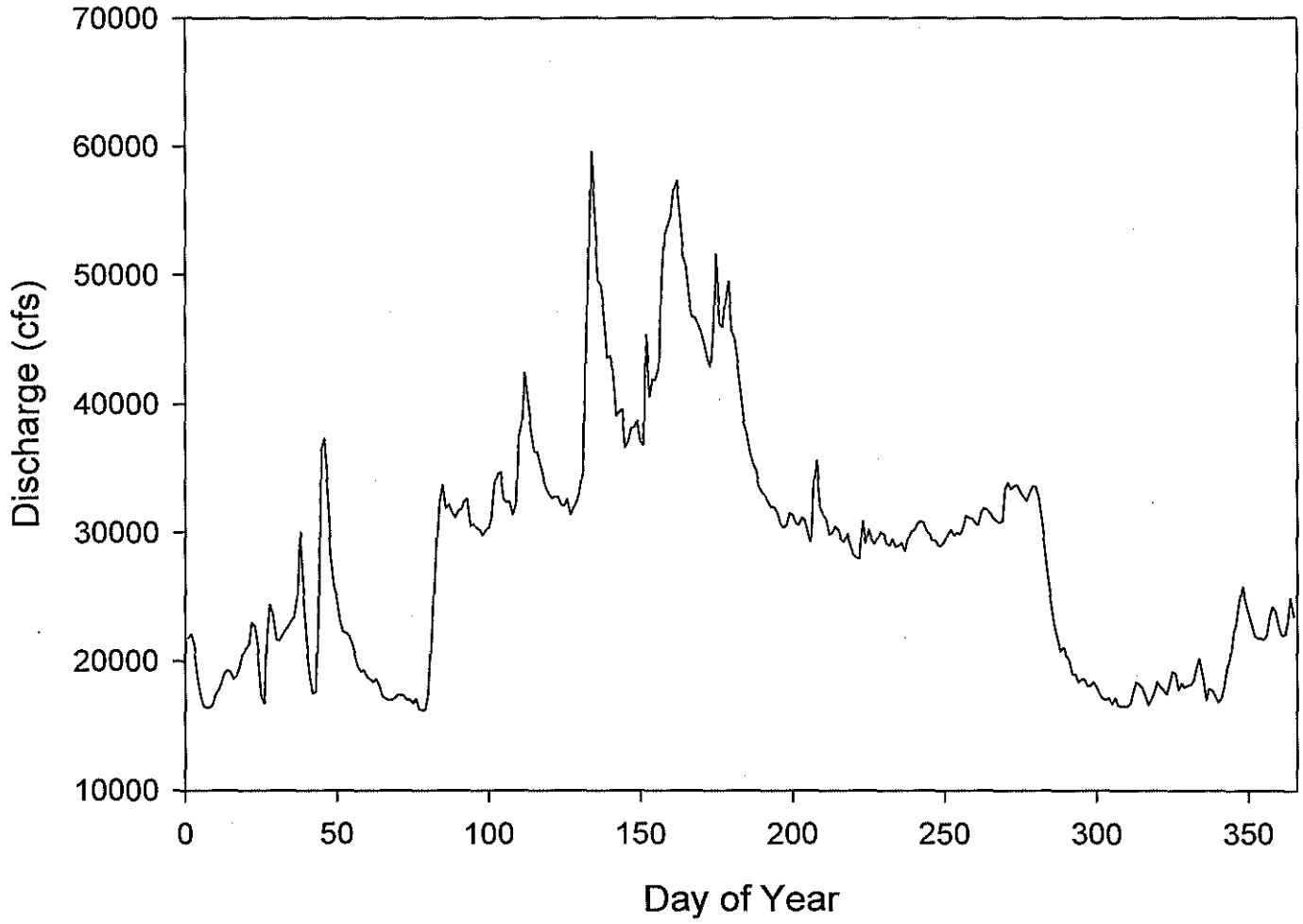
Results

Due to insufficient personnel the first creel period (Creel Period 1) was missed in 2005. A single creel was conducted while training a new creel clerk. The information from this creel is included but for the most part the results are those of creel periods 2 through 7. The 2005 creel year was marked by very low water throughout the year but otherwise showed characteristics of a natural hydrograph (Figure 2), with a peak in May followed by another peak in June. The lack of water probably limited the floodplain connectivity benefits of the small peaks. Due to lack of personnel only one creel was conducted during the first four week time period.

Table 1. An example of the creel schedule for the 20 August through 16 September survey period for the Missouri River during 2005.

Count Time	Creel clerk	Date	Direction	Boat ramp
Weekends				
1707	Walt	8/27/2005	Down	Hamburg
0712	Walt	8/28/2005	Down	Plattsmouth
1345	Walt	9/3/2005	Up	Nebr City
1036	Walt	9/4/2005	Down	Bellevue
Weekdays				
1345	Walt	8/26/2005	Up	Nebr City
1036	Walt	8/30/2005	Up	Hamburg
0920	Walt	9/5/2005	Down	Hamburg
1303	Walt	9/7/2005	Up	Bellevue
1448	Walt	9/14/2005	Down	Hamburg
1634	Walt	9/16/2005	Down	Hamburg

Figure 2. Mean daily discharge (cfs) at Nebraska City during 2005.



Fishing Effort

Anglers spent over 29,000 hours fishing the Missouri River from Bellevue downstream to Camp Creek from 2 April through 14 October 2005 (Table 2). The Plattsmouth segment was the most heavily fished with over 33% of the total use, followed by the Nebraska City segment with over 30% of the use. Hamburg Bend was the least fished segment with less than 7% of the effort. Fishing effort during 2005 was slightly higher in the fall. Almost 64% of the fishing occurred on weekends, although this varied by creel period and segment (Table 3).

Table 4 presents fishing effort by species being sought and creel period. Channel catfish, flathead catfish and catfish as a group accounted for more than 51% of angler effort. Over 55% of the fishing effort was by anglers that were just fishing for whatever species was biting. Fishing effort for all catfish species combined increased starting on 25 June and remained high the rest of the year. Table 5 presents fishing effort by species sought and river segment. Anglers at Plattsmouth targeted the most species including sturgeon.

Effort by macrohabitat fished is presented in Table 6 by creel period and in Table 7 by segment. Over 52% of the fishing effort during 2005 occurred in inside bend habitat. This effort was higher in the middle part of the bend, followed by the lower and upper. Outside bends, which by the design of the Missouri River, offer an almost equally abundant habitat as inside bend habitat, were fished 37.5% of the time. The middle part of the bend was fished slightly more than the lower and upper sections. Anglers use of inside bends was greatest (> 73%) from 30 April through 27 May.

Effort by microhabitat fished is presented in Table 8 by creel period and in Table 9 by segment. Channel bank cutting (24.5%), wing dike point bars (16.1%) and wing dike inner holes (12.6%) were the most popular microhabitats for anglers in this reach respectively. Over 53% of anglers hours were spent in these three microhabitats. Wing dike microhabitats were fished over 37% of the time followed by channel bank cutting (24.5%), revetment (11.2%) and tributary microhabitats (11.0%). No fishing patterns were apparent for microhabitats by either period or segment. These data are being collected each year and will be used to develop educational fishing materials for the channelized Missouri River.

Table 2. Angler effort (hours) and standard errors by segment and creel period by anglers fishing the Missouri River during 2005.

Segment	Period							Segment totals	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14		
Bellevue	0	151 ± 91	523 ± 353	452 ± 196	311 ± 172	1516 ± 572	779 ± 395	3732 ± 822	12.6
Plattsmouth	0	2835 ± 811	1766 ± 549	1231 ± 205	1101 ± 523	1559 ± 351	1276 ± 450	9767 ± 1215	33.4
Goose Island	0	415 ± 195	652 ± 236	814 ± 263	608 ± 227	1061 ± 307	1389 ± 554	4940 ± 776	16.9
Nebraska City	277	1332 ± 638	945 ± 492	1290 ± 346	1188 ± 390	2492 ± 437	1296 ± 373	8820 ± 1098	30.2
Hamburg	0	271 ± 41	0	428 ± 190	517 ± 315	397 ± 143	384 ± 288	1998 ± 432	6.8
Period totals	277	5004 ± 1055	3886 ± 851	4215 ± 553	3725 ± 600	7025 ± 870	5124 ± 942	29257 ± 2037	
Percent	0.1	17.1	13.3	14.4	12.7	24.0	17.5		

Table 3. Angler effort (hours) and standard errors by day type by creel period and segment by anglers fishing the Missouri River during 2005.

Period	Day Type		Period totals
	Weekend	Weekday	
4/2 - 4/29		277	277
4/30 - 5/27	2993	2012	5004
	± 911	± 532	± 1055
5/28 - 6/24	2380	1506	3886
	± 719	± 456	± 851
6/25 - 7/22	2615	1600	4215
	± 438	± 337	± 553
7/23 - 8/19	2122	1603	3725
	± 433	± 415	± 600
8/20 - 9/16	4350	2675	7025
	± 456	± 741	± 870
9/17 - 10/14	4172	952	5124
	± 847	± 413	± 942
Total	18632	10625	29257
	± 1628	± 1223	± 2037
Segment	Weekend	Weekday	Segment totals
Bellevue	2145	1587	3732
	± 569	± 593	± 822
Plattsmouth	5889	3878	9767
	± 957	± 749	± 1215
Goose Island	3457	1483	4940
	± 675	± 381	± 776
Nebraska City	5524	3296	8820
	± 900	± 629	± 1098
Hamburg	1617	381	1998
	± 381	± 204	± 432
Total	18632	10625	29257
	± 1628	± 1223	± 2037

Table 4. Angler effort (hours) by species sought and creel period by anglers fishing the Missouri during 2005.

Species	Period							Species totals	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14		
Shovelnose sturgeon		288						288	1.1
"Skipjack "						120		120	0.5
Grass carp						48		48	0.2
Common carp		49		98		425	87	659	2.6
Bighead carp			40					40	0.2
Buffalo		25						25	0.1
Catfish		763	336	674	2547	2901	1627	8848	34.4
Channel catfish			134	1124				1258	4.9
Flathead catfish		113	468	777		965	1247	3570	12.2
Bluegill						48		48	0.2
Freshwater drum		113						113	0.4
Any species	277	3652	2908	1542	1178	2517	2164	14238	55.4
Total	277	5003	3886	4215	3725	7024	5125	29255	
Percent	0.9	17.1	13.3	14.4	12.7	24.0	17.5		

Table 5. Angler effort (hours) by species sought and segment by anglers fishing the Missouri River during 2005.

Species	Segment					Species totals	Percent
	Bellevue	Plattsmouth	Goose Island	Nebraska City	Hamburg		
Shovelnose sturgeon	61	227				288	1.1
"Skipjack"		120				120	0.5
Grass carp			48			48	0.2
Common carp	138	287	24	161	49	659	2.6
Bighead carp	40					40	0.2
Buffalo					25	25	0.1
Catfish	1232	1989	1542	3294	791	8848	34.4
Channel catfish	169	385	242	291	171	1258	4.9
Flathead catfish	235	1752	712	652	219	3570	12.2
Bluegill			48			48	0.2
Freshwater drum		113				113	0.4
Any species	1856	4894	2325	4421	743	14239	55.4
Total	3731	9767	4941	8819	1998	29256	
Percent	12.8	33.4	16.9	30.1	6.8		

Table 6. Angler effort (hours) by macrohabitat and creel period by anglers fishing the Missouri River during 2005.

Macrohabitat	Period							Totals	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14		
Tributary mouth		365	325	514	507	562	388	2661	9.0
Upper inside bend	277	567		315	419	518	329	2425	8.3
Middle inside bend		2464	1710	648	793	2854	977	9446	32.3
Lower inside bend		668		671	699	530	797	3365	11.5
Inside bend total	277	3699	1710	1634	1911	3902	2103	15236	52.1
Upper outside bend		205	288	469	177	401	750	2290	7.8
Middle outside bend		163	744	979	455	1177	1290	4808	16.4
Lower outside bend		573	597	621	510	982	593	3876	13.2
Outside bend total		941	1629	2069	1142	2560	2633	10974	37.5
Upper secondary channel									
Middle secondary channel									
Lower secondary channel			221		125			346	1.2
Secondary channel total			221		125			346	1.2
Secondary channel non-connected					39			39	0.1
Total	277	5005	3885	4217	3724	7024	5124	29256	
Percent	0.9	17.1	13.3	14.4	12.7	24.0	17.5		

Table 7. Angler effort (hours) by macrohabitat and segment by anglers fishing the Missouri River during 2005.

Macrohabitat	Segment					Totals	Percent
	Bellevue	Plattsmouth	Goose Is	Nebr City	Hamburg		
Tributaries total	508	983	537	605	28	2661	9.0
Upper inside bend	500	1100		678	148	2426	8.3
Middle inside bend	1098	4005	1080	2916	347	9446	32.3
Lower inside bend	398	1322	354	716	575	3365	11.5
Inside bend total	1996	6427	1434	4310	1070	15237	52.1
Upper outside bend	129	953	96	1075	37	2290	7.8
Middle outside bend	287	790	1614	1393	724	4808	16.4
Lower outside bend	773	320	1259	1386	139	3877	13.2
Outside bend total	1189	2063	2969	3854	900	10975	37.5
Upper secondary channel							
Middle secondary channel							
Lower secondary channel		294		52		346	1.2
Secondary channel total		294		52		346	1.2
Secondary channel non-connected	39					39	0.1
Total	3732	9767	4940	8821	1998	29258	99.9
Percent	12.8	33.4	16.9	30.1	6.8		

Table 8. Angler effort (hours) by microhabitat and creel period by anglers fishing the Missouri River during 2005.

Microhabitat	Period							Totals	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14		
Tributary above				124	166	167	195	652	2.2
Tributary mouth		365	325	222	244	138	242	1536	5.3
Tributary upper bank					129	166	146	441	1.5
Tributary lower bank			221					221	0.8
Tributary below					205	178		383	1.3
Tributaries total		365	546	346	744	649	583	3233	11.0
Channel bank cutting		980	546	965	854	1688	2137	7170	24.5
Channel bank filling	277	92						369	1.3
Wing dike upper dike			937	382	155	138		1612	5.5
Wing dike hole		586	80			69	323	1058	3.6
Wing dike inner hole		791	221	387	440	1772	87	3698	12.6
Wing dike point bar		1400	78	709	976	1149	398	4710	16.1
Wing dike total		2777	1316	1478	1571	3128	808	11078	37.9
Notched dike upper dike					48		128	176	0.6
Notched dike hole							259	259	0.9
Notched dike inner hole		66	52	74	214	229	317	952	3.3
Notched dike point bar		46						46	0.2

Table 8. Continued.

Microhabitat	Period							Totals	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14		
Notched dike total	0	112	52	74	214	229	681	1362	4.7
Chevron below						115	230	345	1.2
Chevron total						115	230	345	1.2
Revetment scallop above		113	110	60				283	1.0
Revetment scallop mouth		113	288	138			50	589	2.0
Revetment scallop upper pool		106	40	327	74	416	492	1455	5.0
Revetment scallop lower pool				77	58	96		231	0.8
Revetment scallop below			309	215	141	58		723	2.5
Revetment scallop total		332	747	817	273	570	542	3281	11.2
L-head / Kicker outside dike			270					270	0.9
L-head / Kicker inside dike		322	173	358		283	248	1384	4.7
L-head / Kicker hole		25	235	129	68	236		693	2.4
L-head / Kicker total		347	678	487	68	519	248	2347	8.0

Table 9. Angler effort (hours) by microhabitat and segment by anglers fishing the Missouri River during 2005.

Microhabitat	Segment					Totals	Percent
	Bellevue	Plattsmouth	Goose Is	Nebr City	Hamburg		
Tributary above	214	227		211		652	2.2
Tributary mouth	235	743	268	291		1537	5.3
Tributary upper bank	293	40		81		414	1.5
Tributary lower bank		221				221	0.8
Tributary below		120	101	161		382	1.3
Tributaries total	742	1351	369	744		3206	11.0
Channel bank cutting	888	1863	1541	2302	577	7171	24.5
Channel bank filling				369		369	1.3
Wing dike upper dike	468	485		634	24	1611	5.5
Wing dike hole	155	684	149	46	25	1059	3.6
Wing dike inner hole	413	1778	591	878	37	3697	12.6
Wing dike point bar	344	2202	450	1301	414	4711	16.1
Wing dike total	1380	5149	1190	2859	500	11078	37.9
Notched dike upper dike		80	96			176	0.6

Table 9. Continued.

Microhabitat	Segment					Totals	Percent
	Bellevue	Plattsmouth	Goose Is	Nebr City	Hamburg		
Notched dike hole				259		259	0.9
Notched dike inner hole	17	258	76	441	160	952	3.3
Notched dike point bar				46		46	0.2
Notched dike total	17	338	172	746	160	1433	4.9
Chevron below				58	287	345	1.2
Chevron total				58	287	345	1.2
Revetment scallop above		224	48		12	284	1.0
Revetment scallop mouth		411	50	67	61	589	2.0
Revetment scallop upper pool	109	202	515	319	311	1456	5.0
Revetment scallop lower pool	58	77	96			231	0.8
Revetment scallop below	80	73	309	260		722	2.5
Revetment scallop total	247	987	1018	646	384	3282	11.2
L-head / Kicker outside dike				270		270	1.0
L-head / Kicker inside dike	121	80	348	797	37	1383	4.7
L-head / Kicker hole	336		302	29	25	692	2.4
L-head / Kicker total	457		650	826	62	1995	6.8

Catch

Anglers caught over 7,800 fish while fishing the Missouri River during 2005 (Table 10). The catch per period ranged from 483 fish caught from 28 May through 24 June to 2,543 fish caught from 20 August through 16 September. Over 61% of the catch occurred in the Plattsmouth and the Nebraska City segments. Catch peaked during various periods for the different segments.

Anglers harvested over 3,400 fish during 2005 (Table 11), representing just under 44% of the fish caught. The percent of fish harvested by creel period ranged from 26.7% to 83.0%. The lowest rate of fish harvested (26.7%) occurred from 20 August through 16 September. Anglers released over 4,400 fish during 2005 (Table 12) with the percent of fish released ranging from 17.2% to 73.3% by period. Over 60% of the fish caught were released during the sixth (20 August through 16 September) and seventh periods (17 September through 14 October).

Catch, harvest and release rates by period and segment are presented in Table 13. Total catch rates ranged from 0.17 fish/hr during creel periods three (28 May through 24 June) and five (23 July through 19 August) to 0.34 fish/hr during creel period 2 (30 April through 27 May). Harvest rates ranged from 0.05 to 0.15 fish/hr and release rates ranged from 0.02 to 0.21 fish/hr. Catch rates by segment were derived by dividing the total number of fish caught in that segment by the number of hours of effort by time period. Catch rates by segment ranged from 0.25 fish/hr at Plattsmouth to 0.30 fish/hr at Bellevue.

Table 10. Estimated total catch (number of fish) and standard deviation by segment and period by anglers on the Missouri River during 2005.

Segment	Period							Segment totals	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14		
Bellevue	0	800 ± 33	37 ± 18	62 ± 31	60 ± 34	657 ± 320	263 ± 132	1121 ± 351	14.3
Plattsmouth	0	212 ± 407	238 ± 69	283 ± 72	258 ± 172	467 ± 146	375 ± 137	2422 ± 496	30.9
Goose Island	0	542 ± 105	85 ± 31	180 ± 57	57 ± 22	510 ± 320	321 ± 162	1364 ± 380	17.4
Nebraska City	43	72 ± 300	123 ± 50	315 ± 102	215 ± 141	822 ± 278	351 ± 153	2411 ± 473	30.8
Hamburg	0	37 ± 44	0	97 ± 58	133 ± 105	87 ± 39	133 ± 110	522 ± 173	6.7
Period totals	43	1668 ± 520	483 ± 92	938 ± 151	723 ± 250	2543 ± 553	1442 ± 313	7840 ± 876	
Percent	0.5	21.3	6.2	12.0	9.2	32.4	18.4		

Table 11. Estimated number of harvested fish and standard deviation by segment and period by anglers on the Missouri River during 2005.

Segment	Period							Segment totals	Percent	Percent of total catch harvested
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14			
Bellevue	0	24 ± 24	19 ± 9	34 ± 22	44 ± 28	116 ± 45	108 ± 60	345 ± 87	10.0	30.1
Plattsmouth	0	417 ± 304	108 ± 53	157 ± 58	216 ± 144	116 ± 28	165 ± 76	1179 ± 355	34.4	48.7
Goose Island	0	113 ± 77	34 ± 17	94 ± 52	47 ± 19	93 ± 32	142 ± 88	522 ± 134	15.2	38.3
Nebraska City	0	265 ± 209	37 ± 17	182 ± 79	180 ± 118	305 ± 128	113 ± 35	1082 ± 286	31.5	44.9
Hamburg	0	36 ± 36	0	60 ± 44	113 ± 86	51 ± 27	42 ± 32	301 ± 111	8.8	57.7
Period totals	0	855 ± 589	199 ± 578	526 ± 137	600 ± 422	680 ± 627	570 ± 90	3430 ± 495		43.8
Percent	0.0	25.0	5.8	15.3	17.5	19.8	16.6			
Percent of total catch harvested		51.2	41.2	56.1	83.0	26.7	39.5	43.8		

Table 12. Estimated number of released fish and standard deviation by segment and period by anglers on the Missouri River during 2005.

Segment	Period							Segment totals	Percent	Percent of total catch released
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14			
Bellevue	0	17 ± 11	18 ± 12	28 ± 17	16 ± 9	541 ± 315	155 ± 80	776 ± 326	17.6	69.2
Plattsmouth	0	384 ± 139	130 ± 49	127 ± 35	42 ± 31	351 ± 148	29 ± 67	1242 ± 224	28.2	50.9
Goose Island	0	99 ± 43	50 ± 26	86 ± 16	10 ± 7	417 ± 319	179 ± 75	842 ± 333	19.1	61.2
Nebraska City	0	277 ± 119	86 ± 49	133 ± 49	35 ± 25	518 ± 240	238 ± 118	1330 ± 302	30.1	55.2
Hamburg	0	36 ± 19	0	37 ± 28	20 ± 20	37 ± 14	91 ± 78	221 ± 89	5.0	42.3
Period totals	43	813 ± 189	284 ± 75	411 ± 70	124 ± 46	1864 ± 530	872 ± 191	4412 ± 605		56.3
Percent	1.0	18.4	6.4	9.3	2.8	42.2	19.8			
Percent of total catch released	100	48.7	58.8	43.8	17.2	73.3	60.5	56.3		

Table 13. Catch, harvest and release rates (number of fish per angler-hour) by creel period and segment by anglers fishing the Missouri River during 2005.

	Harvest Rate	Released Rate	Total Catch Rate
Period			
4/2 - 4/29	0.00	0.16	0.16
4/30 - 5/27	0.13	0.21	0.34
5/28 - 6/24	0.05	0.13	0.17
6/25 - 7/22	0.11	0.14	0.25
7/23 - 8/19	0.15	0.02	0.17
8/20 - 9/16	0.10	0.16	0.26
9/17 - 10/14	0.11	0.16	0.27
Total	0.11	0.14	0.25
Segment			
Bellevue	0.09	0.21	0.30
Plattsmouth	0.12	0.13	0.25
Goose Island	0.11	0.17	0.28
Nebraska City	0.12	0.15	0.27
Hamburg	0.15	0.11	0.26

Species catch

Shovelnose sturgeon

Shovelnose sturgeon were sought by only 1.7% of anglers interviewed (Table 14). Anglers caught an estimated 1,058 shovelnose sturgeon, fourth most abundant species caught during the 2005 creel season (Table 15). Over 41% of the shovelnose sturgeon caught were released. Total catch rate for shovelnose sturgeon was 0.04 fish/hr (Table 16). Shovelnose sturgeon were caught in all segments, with over 48% of the total catch coming from the Plattsmouth segment (Table 18). Over 83% of the shovelnose sturgeon were caught during the second creel period (4/27 - 5/24).

Common carp

Common carp were sought by only 2.4% of anglers interviewed. Anglers caught an estimated 582 common carp, fifth most abundant species caught, during the 2005 creel season. Almost 30% of the common carp caught were harvested. Total catch rate for common carp was 0.03 fish/hr. Over 33% of the common carp harvested were larger than preferred length (530 mm) (Table 17). Common carp were caught in all segments but most (58%) were caught from the Plattsmouth and Nebraska City segments (Table 19). Most common carp (87.6%) were caught during the fourth (6/22 - 7/19) and sixth (8/17 - 9/13) creel periods.

Channel catfish

Many anglers indicated that they were fishing for "catfish", which would have included blue catfish, channel catfish and flathead catfish. When these anglers were combined with anglers specifically seeking channel catfish and flathead catfish, "catfish" were sought by 51% of anglers interviewed. Channel catfish were specifically identified as being sought by 6.0% of the anglers that were interviewed, and was the third most abundant fish caught. Anglers caught an estimated 1,226 channel catfish in 2005, of which 53.3% were harvested. Total catch rate for channel catfish was 0.04 fish/hr and the harvest rate was 0.02 fish/hr. The quality of the channel catfish fishery was fair with 55% the channel catfish harvested larger than quality length (410 mm) and 6% being larger than preferred length (610 mm). Channel catfish were caught in all

segments with almost 67% coming from the Plattsmouth and Nebraska City segments (Table 20). Channel catfish were caught throughout the survey period with 23.1% of the total catch occurring during the second (4/30 - 5/27) and 22.8% during the seventh (9/14 - 10/11) creel periods.

Flathead catfish

Flathead catfish were sought specifically by 12.0% of the anglers interviewed and were the most abundant species caught. Anglers caught an estimated 3,143 flathead catfish from 2 April through 14 October 2005, of which 50.7% were harvested. Total catch rate for flathead catfish was 0.08 fish/hr and the harvest rate was 0.05 fish/hr. The quality of the flathead catfish fishery was poor with 27% of the flathead catfish harvested being larger than quality length (510 mm), 7% larger than preferred length (610 mm) and 2% larger than memorable length (710 mm). Flathead catfish were caught in all segments with the highest overall percentage of total catch coming from the Nebraska City segment (31.8%) (Table 21). Most flathead catfish (49.6%) were caught between 19 August and 16 September.

Freshwater drum

Freshwater drum were only sought by 0.3% of the anglers interviewed, however they were the second most abundant species caught. Anglers caught an estimated 1,386 freshwater drum during 2005, of which 79.5% were released. Total catch rate for freshwater drum was 0.05 fish/hr. The quality of the freshwater drum fishery was good with 79% of the drum harvested being larger than quality length (300 mm), 29% larger than preferred length (380 mm) and 14% larger than memorable length (510 mm). Freshwater drum were caught in all segments with over 67% of the catch coming from the Plattsmouth and Nebraska City segments. Freshwater drum were caught throughout the survey period with nearly 30% of the total harvest occurring between 20 August and 16 September (Table 22).

Other species

Over 43% of anglers interviewed indicated that they were seeking whatever species were biting. Species other than channel catfish, flathead catfish, common carp, shovelnose sturgeon and freshwater drum

made up less than 6% of the total catch (Table 15). This included pallid sturgeon, gar, "skipjack", silver carp, smallmouth buffalo, yellow bullhead, blue catfish, white bass and sauger. Less than 25% of these fish and no pallid sturgeon were harvested.

Table 14. Number and percent of anglers who indicated that they were seeking a particular species while fishing the Missouri River during 2005.

Species	Number	Percent
Shovelnose sturgeon	11	1.7
"Skipjack"	1	0.2
Grass carp	1	0.2
Common carp	15	2.4
Bighead carp	2	0.2
Buffalo	1	0.2
Catfish	211	33.0
Channel catfish	38	6.0
Flathead catfish	77	12.0
Bluegill	1	0.2
Freshwater drum	2	0.3
Any species	280	43.8
Total	639	

Table 15. Estimated total number of fish harvested, released and caught and the standard error by species by anglers fishing the Missouri River during 2005.

Species	Harvested		Released		Total	
	Catch	SE	Catch	SE	Catch	SE
Pallid sturgeon	0		13	6	13	6
Shovelnose sturgeon	617	257	442	98	1058	290
Gar family	0		98	44	98	44
"Skipjack"	72	42	33	18	105	45
Common carp	172	68	410	94	582	114
Silver carp	0		24	13	24	13
Smallmouth buffalo	18	11	0		18	11
Yellow bullhead	20	10	46	27	66	29
Blue catfish	0		42	23	42	23
Channel catfish	653	113	573	144	1226	204
Flathead catfish	1594	271	1549	546	3143	604
White bass	0		61	35	61	35
Sauger	0		7	4	7	4
Freshwater drum	284	85	1102	158	1386	180
Total	3430	495	4412	605	7840	876

Table 16. Total catch, harvest and release rates by species by anglers fishing the Missouri River during 2005.

Species	Harvest	Release	Catch
Pallid sturgeon	0	< 0.001	< 0.001
Shovelnose sturgeon	0.01	0.02	0.04
Gar family	0	< 0.01	< 0.01
"Skipjack"	< 0.01	< 0.01	< 0.01
Common carp	< 0.01	0.02	0.03
Silver carp	0	< 0.01	< 0.01
Smallmouth buffalo	< 0.01	0	< 0.01
Yellow bullhead	< 0.01	< 0.01	< 0.01
Blue catfish	0	< 0.01	< 0.01
Channel catfish	0.02	0.02	0.04
Flathead catfish	0.05	0.03	0.08
White bass	0	< 0.01	< 0.01
Sauger	0	< 0.01	< 0.01
Freshwater drum	< 0.01	0.04	0.05
Total	0.11	0.14	0.25

Table 17. PSD and RSD values for harvested fish by anglers fishing the Missouri River during 2005.

Species	PSD	RSD-P (preferred)	RSD-M (memorable)	RSD-T (trophy)
Common carp	44	33	11	
Channel catfish	55	6	3	
Flathead catfish	27	7	2	2
Freshwater drum	79	29	14	

Table 18. Estimated total catch (harvested fish) of shovelnose sturgeon by segment and period and totals with standard deviations for anglers fishing the Missouri River during 2005.

Segment	Period							Harvested	Released	Totals	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14				
Bellevue		38 (24)	2 (0)	5 (0)		11 (0)		24 ± 24	33 ± 16	57 ± 35	5.4
Plattsmouth		440 (291)	52 (0)	15 (8)		6 (0)		299 ± 207	214 ± 76	512 ± 230	48.4
Goose Island		144 (91)	24 (0)	10 (5)		4 (0)		96 ± 61	87 ± 41	182 ± 84	17.2
Nebraska City		235 (166)	6 (0)	19 (10)		18 (0)		175 ± 135	103 ± 43	278 ± 149	26.3
Hamburg		23 (23)		3 (0)		2 (0)		23 ± 23	5 ± 4	28 ± 23	2.6
Harvested		594 ± 257	0	22 ± 13		0		617 ± 257			58.3
Released		286 ± 89	84 ± 32	30 ± 9		42 ± 23			442 ± 98		41.8
Total		880 ± 287	84 ± 32	52 ± 13		42 ± 23				1058 ± 290	
Percent	0.0	83.2	7.9	4.9	0.0	4.0		58.3	41.8		

Table 19. Estimated total catch (harvested fish) of common carp by segment and period and totals with standard deviations by anglers fishing the Missouri River during 2005.

Segment	Period							Harvested	Released	Total	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14				
Bellevue			5 (0)			88 (6)	10 (0)	6 ± 4	97 ± 65	103 ± 66	17.7
Plattsmouth			8 (0)	76 (32)		55 (20)	8 (0)	52 ± 35	95 ± 39	147 ± 51	25.3
Goose Island			3 (0)	52 (31)		28 (15)	2 (0)	46 ± 34	39 ± 18	85 ± 37	14.6
Nebraska City			8 (0)	88 (47)		79 (16)	19 (0)	63 ± 47	131 ± 42	194 ± 61	33.3
Hamburg				29 (0)		16 (5)	9 (0)	5 ± 5	49 ± 31	54 ± 31	9.3
Harvested			0	109 ± 63		63 ± 26	0	172 ± 68			29.6
Released			24 ± 11	136 ± 55		203 ± 71	48 ± 25		410 ± 94		70.4
Total			24 ± 11	245 ± 83		265 ± 73	48 ± 25			582 ± 114	
Percent	0.0	0.0	4.1	42.1	0.0	45.5	8.2	29.6	70.4		

Table 20. Estimated total catch (harvested fish) of channel catfish by segment and period and totals with standard deviations by anglers fishing the Missouri River during 2005.

Segment	Period							Harvested	Released	Total	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14				
Bellevue		3 (0)	6 (5)	15 (8)	25 (16)	31 (20)	58 (0)	48 ± 17	90 ± 46	138 ± 50	11.3
Plattsmouth		156 (62)	40 (34)	47 (41)	76 (66)	32 (25)	59 (0)	228 ± 77	183 ± 77	411 ± 131	33.5
Goose Island		22 (10)	12 (9)	32 (26)	38 (31)	26 (22)	28 (0)	98 ± 25	59 ± 21	158 ± 36	12.9
Nebraska City		88 (36)	12 (9)	47 (36)	64 (57)	111 (90)	90 (0)	227 ± 74	185 ± 102	412 ± 134	33.6
Hamburg		13 (6)	0	14 (14)	19 (19)	15 (12)	45 (0)	51 ± 20	56 ± 46	107 ± 50	8.7
Harvested		114 ± 60	57 ± 27	126 ± 26	189 ± 68	167 ± 55	0	653 ± 113			53.3
Released		169 ± 81	13 ± 6	30 ± 15	33 ± 16	49 ± 23	280 ± 115		573 ± 144		46.7
Total		283 ± 137	70 ± 29	156 ± 24	222 ± 74	217 ± 53	280 ± 115			1226 ± 204	
Percent	0.0	23.1	5.7	12.7	18.1	17.7	22.8	53.3	46.7		

Table 21. Estimated total catch (harvested fish) of flathead catfish by segment and period and totals with standard deviations by anglers fishing the Missouri River during 2005.

Segment	Period							Harvested	Released	Total	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14				
Bellevue		0	12 (11)	26 (23)	28 (28)	422 (86)	114 (85)	233 ± 69	370 ± 323	603 ± 321	19.2
Plattsmouth		11 (4)	55 (42)	71 (68)	142 (142)	242 (70)	185 (121)	447 ± 161	259 ± 163	706 ± 227	22.5
Goose Island		0	12 (12)	30 (27)	14 (14)	386 (54)	162 (90)	198 ± 73	406 ± 323	604 ± 329	19.2
Nebraska City		55 (21)	72 (19)	87 (81)	121 (121)	471 (194)	192 (83)	520 ± 165	478 ± 250	998 ± 300	31.8
Hamburg		0	0	40 (40)	85 (85)	39 (33)	67 (38)	196 ± 102	36 ± 18	232 ± 110	7.4
Harvested		26 ± 22	84 ± 29	239 ± 71	391 ± 203	437 ± 106	417 ± 120	1594 ± 271			50.7
Released		40 ± 34	68 ± 50	15 ± 7	0	1124 ± 541	302 ± 47		1549 ± 546		49.3
Total		66 ± 55	152 ± 55	254 ± 73	391 ± 203	1560 ± 543	719 ± 131			3143 ± 604	
Percent	0.0	2.1	4.8	8.1	12.4	49.6	22.9	50.7	49.3		

Table 22. Estimated total catch (harvested fish) of freshwater drum by segment and period and totals with standard deviations by anglers fishing the Missouri River during 2005.

Segment	Period							Harvested	Released	Total	Percent
	4/2 - 4/29	4/30 - 5/27	5/28 - 6/24	6/25 - 7/22	7/23 - 8/19	8/20 - 9/16	9/17 - 10/14				
Bellevue		0	11 (3)	11 (3)	7 (0)	100 (3)	30 (0)	10 ± 5	149 ± 71	158 ± 71	11.4
Plattsmouth		130 (57)	64 (20)	59 (8)	40 (7)	124 (2)	52 (12)	109 ± 62	361 ± 92	470 ± 115	33.9
Goose Island		30 (12)	26 (8)	38 (5)	5 (1)	59 (1)	55 (17)	45 ± 23	168 ± 51	213 ± 50	15.4
Nebraska City	43 (0)	127 (42)	21 (7)	73 (8)	31 (3)	117 (6)	50 (30)	95 ± 52	368 ± 91	464 ± 106	33.5
Hamburg		23 (7)	0	11 (5)	29 (9)	8 (1)	12 (4)	26 ± 11	56 ± 24	82 ± 25	5.9
Harvested	0	121 ± 73	38 ± 18	30 ± 7	20 ± 10	13 ± 7	63 ± 37	284 ± 85			20.5
Released	43	190 ± 61	84 ± 31	163 ± 63	91 ± 47	396 ± 109	135 ± 46		1102 ± 158		79.5
Total	43	311 ± 109	121 ± 31	192 ± 61	111 ± 46	409 ± 108	198 ± 46			1386 ± 180	
Percent	< 0.1	22.4	8.7	13.9	8.0	29.5	14.3	20.5	79.5		

Angling

A long-term goal of conducting annual creel surveys on the Missouri River is to develop educational materials for recreational fishing on the Missouri River, based upon survey results. We will compare season, bait, macrohabitat and microhabitat fished and river conditions when anglers are specifically seeking a certain species to catch.

When anglers target certain species is presented in Table 23. Catfish in general and flatheads specifically were targeted throughout the year. Shovelnose sturgeon were targeted in the spring. Table 24 presents information on the bait used when targeting a specific species and Table 25 presents information on the percent of fish caught using specific baits. Corn was the most common bait used to target common carp (50.0%) but over 56% of the carp were caught on nightcrawlers. Over 36% of the anglers seeking channel catfish used night crawlers and this proved to be the most effective way of catching channel catfish. Anglers seeking flathead catfish used live fish (minnows, chubs, "skipjack". goldfish, bluegill, common carp, channel catfish, bluegill and bullhead) 49.4% of the time but only 19.8% of the flathead catfish were caught using these same species, night crawlers accounted for over 46% of all flatheads caught. Night crawlers were the most common bait used to catch both shovelnose sturgeon and freshwater drum. In fact, night crawlers were by far the most common bait used regardless of species sought.

Table 26 presents information on the macrohabitat fished by anglers seeking a particular species and Table 27 presents information on which macrohabitat each species was actually caught from. Nearly 60% of anglers seeking common carp fished inside bends and just over 77% of the carp were caught in this macrohabitat. The most popular habitat for anglers seeking channel catfish was outside bends (65.8%) but only 43% of the channel catfish were caught in this macrohabitat. Anglers seeking flathead catfish spent over 52% of their total effort in outside bend macrohabitats and only caught 47.5% of all flathead catfish in this macrohabitat. The middle inside bend proved to be the best habitat to catch flathead catfish, representing 27.6% of the catch. The middle inside bend was the best macrohabitat for catching shovelnose sturgeon, while middle inside and middle outside bends were the best macrohabitat habitat for freshwater drum.

Table 28 presents information on the microhabitat fished by anglers seeking a particular species and Table 29 presents information on the microhabitats where each species was actually caught. Most anglers targeting shovelnose sturgeon (81.8%) fished the channel bank cutting microhabitat. Only 31.8% of shovelnose sturgeon were caught in this microhabitat. Over 53% of all anglers seeking common carp fished in tributary and wing dike microhabitats, while just over 59.1% of carp were caught in these microhabitats. Over 34% of the total effort fishing for channel catfish was from revetment scallop microhabitat but only 19% of the catch was from these microhabitats. Flathead anglers concentrated mainly on the channel bank cutting (23.4%) and inner hole (11.7%). Channel bank cutting (17.8%) and wing dike point bars (16.8%) proved to be the best macrohabitat for flathead catfish. More freshwater drum (30.5%) were caught in wing dike microhabitats than other microhabitats.

Tables 30 and 31 compare the species sought and number of each species caught by bank and boat anglers, respectively. Bank anglers were more generalists seeking any species over 58% of the time while boat anglers targeted catfish over 63% of the time. Boat anglers caught a higher percentage of channel and flathead catfish while bank anglers caught more shovelnose sturgeon and freshwater drum. Table 32 compares the percent of bank and boat anglers fishing different macrohabitats and Table 33 compares the percent of bank and boat anglers fishing different microhabitats. Macrohabitat selection was fairly similar for both groups, although bank anglers selected a greater percentage of tributary and boat anglers outside bend macrohabitats. Bank and boat anglers both fished the main channel bank cutting, wing dike inner hole and point bar most frequently. Bank anglers fished revetment microhabitats more often while boat anglers fished kicker structures more often.

Daily water temperatures and secchi disk (cm) readings are presented in Figures 3 and 4. Water temperature ranged from 12 to 33 °C throughout the year and increased gradually until late July when temperatures started to decline. Secchi disk readings fluctuated but increased early, declined and then gradually increased the rest of the year. Secchi disk readings ranged from 8 to 43 cm. Table 34 presents information on water temperature when anglers chose to target a particular species and Table 35 presents information on water temperature when fish were caught. Most anglers targeted channel catfish when water temperatures were greater than 26 °C. Flathead catfish were targeted after water temperatures

reach 21 °C. Shovelnose sturgeon were caught at all water temperatures. Most common carp were caught when water temperatures reached 26 °C. Channel and flathead catfish catch peaked when water temperatures were between 26 and 30 °C. Table 36 presents information on water transparency (secchi disk) when anglers chose to target a particular species and Table 37 presents information on water transparency (secchi disk) when fish were caught. Most shovelnose sturgeon were sought and caught when water transparency was moderate (11 - 30 cm) while common carp, channel and flathead catfish were both sought and caught under a wider range of conditions.

Table 23. Percent of anglers seeking a particular species by period while fishing the Missouri River during 2005.

Species	Period							Number	Percent
	3/30 - 4/26	4/27 - 5/24	5/25 - 6/21	6/22 - 7/19	7/20 - 8/16	8/17 - 9/13	9/12 - 10/11		
Shovelnose sturgeon		100						11	1.7
"Skipjack"						100		1	0.2
Grass carp						100		1	0.2
Common carp		13.3		20.0		46.7	20.0	15	2.4
Bighead carp			100					1	0.2
Buffalo		100						1	0.2
Catfish		9.0	4.3	10.4	27.0	35.1	14.2	211	33.0
Channel catfish			13.2	86.8				38	6.0
Flathead catfish	1.3	2.6	6.5	29.9		26.0	33.8	77	12.1
Bluegill						100		1	0.2
Freshwater drum		100						2	0.3
Any species		22.9	18.2	19.3	9.3	20	10.4	280	43.8
Number	1	101	71	135	83	160	88	639	
Percent	0.2	15.8	11.1	21.1	13.0	25.0	13.8		

Table 24. Percent of anglers using types of bait by species sought (n > 1) while fishing the Missouri River during 2005.

Bait	Shovelnose sturgeon	Common Carp	Catfish	Channel catfish	Flathead catfish	Freshwater drum	Any species	Total
Number of anglers	11	14	210	38	77	2	277	632
Green worm	18.2		5.2				15.9	9.0
Night crawler	81.8	42.9	27.6	36.8	26.0	100	66.8	46.8
Minnow			4.3		2.6		0.7	2.2
Chub			13.8	2.6	5.2		1.8	6.2
Cutup fish			3.3	2.6	11.7		1.4	3.3
Stink / blood bait			6.2	7.9	1.3		1.8	3.5
Entrails			1.4		2.6		0.7	1.1
Artificial			0.5				1.1	0.6
Corn		50.0	1.0		2.6		1.4	2.4
Liver			3.3	15.8	5.2		2.9	4.0
Frog							0.4	0.2
Grasshoppers			0.5				1.1	0.6
Shrimp			2.4				0.7	1.1
Doughball			0.5				0.4	0.3
Marshmallows			0.5		1.3		0.4	0.5
Skipjack					2.6			0.3
Goldfish		7.1	18.1	29.0	26.0		1.8	11.9
Common carp			1.0		1.3			0.5
Bullhead			2.4	2.6	1.3		0.7	1.1
Channel			0.5		1.3			0.3
Flathead				2.6				0.2
Bluegill			1.9		9.1			2.1
Crayfish			5.7					1.9

Table 25. Percent of anglers using types of bait by species caught while fishing the Missouri River from Camp Creek to the Kansas State line during 2005.

Bait	Pallid sturgeon	Shov. sturgeon	Gar family	"Skipjack"	Common Carp	Silver carp	Sm buffalo	Yellow bullhead	Blue catfish	Channel catfish	Flathead catfish	White bass	Sauger	Freshwater drum	Percent
Number of fish	1	44	2	4	44	1	1	2	1	58	101	1	3	59	322
Green worm		38.6								5.2	4.0			3.4	8.4
Night crawler	100	61.4	100	25.0	56.8	100				50.0	46.5			64.4	52.9
Minnow										1.7	6.9				2.5
Chub					6.8				100	5.2	5.9			5.1	5.0
Cutup fish										5.2	4.0			1.7	2.5
Stink / blood bait										15.5	7.9			13.6	7.7
Entrails					2.3			50.0		1.7					0.9
Artificial										3.5	1.0	100			1.2
Corn					13.6						4.0				3.1
Liver								50.0		1.7	5.9			1.7	2.8
Shrimp											5.0				1.6
Skipjack				75.0											0.9
Goldfish					13.6					10.3	5.0		33.3	6.8	6.8
Bullhead					4.6									1.7	0.9
Channel catfish					2.3						1.0				0.6
Bluegill											2.0				0.6
Crayfish							100				1.0		66.7	1.7	1.6

Table 26. Percent of anglers using macrohabitat by species sought (n > 1) while fishing the Missouri River during 2005.

Macrohabitat	Shovelnose sturgeon	Common carp	Catfish	Channel catfish	Flathead catfish	Freshwater drum	Any species	Total
Number of anglers	11	15	211	38	77	2	280	634
Tributaries total		26.7	8.5	5.3	6.5		11.8	9.7
Upper inside bend	9.1		6.6	5.3	5.2		8.6	7.0
Middle inside bend	81.8	20.0	25.1	15.8	31.2		32.5	29.4
Lower inside bend	9.1	40.0	14.2	7.9	5.2		9.6	11.6
Inside bend total		60.0	45.9	29.0	41.6		50.7	48.0
Upper outside bend			4.3	29.0	11.7		5.0	6.7
Middle outside bend		13.3	18.5	26.3	29.9		16.4	18.9
Lower outside bend			19.9	10.5	10.4		15.4	15.3
Outside bend total		13.3	42.7	65.8	52.0		36.8	40.9
Upper secondary channel			0.5					0.2
Middle secondary channel								
Lower secondary channel			1.4					0.7
Secondary channel total			1.9					0.9
Secondary channel non-connected			1.0					0.3

Table 27. Percent of fish caught by anglers by species by macrohabitat by anglers while fishing the Missouri River during 2005.

Macrohabitat	Pallid Sturgeon	Shovelnose sturgeon	Gar family	Goldeye	Common carp	Silver carp	Smallmouth buffalo	Yellow bullhead	Blue catfish	Channel catfish	Flathead catfish	White bass	Sauger	Freshwater drum	Percent
Number of fish	1	44	2	4	44	1	1	2	1	58	101	1	3	59	322
Tributaries total		2.3		25.0	11.4					5.2	5.9		66.7	10.2	7.4
Upper inside bend		11.4			9.1					8.6	5.9	100		1.7	6.8
Middle inside bend		59.1	50.0		52.3	100			100	27.6	30.7		33.3	37.3	37.8
Lower inside bend		6.8			15.9					15.5	9.9			6.8	10.2
Inside bend total		77.3	50.0	25.0	77.3	100			100	51.7	46.5	100	33.3	45.8	54.8
Upper outside bend				75.0						8.6	9.9			3.4	6.2
Middle outside bend		13.6			9.1		100	100		17.2	18.8			25.4	17.7
Lower outside bend	100	6.8	50.0		2.3					17.2	18.8			15.3	13.9
Outside bend total	100	20.4	50.0	75.0	11.4		100	100		43.0	47.5			44.1	37.8
Upper secondary															
Middle secondary															
Lower secondary															
Secondary channel total															
Secondary channel non-connected															

Table 28. Percent of anglers using microhabitat by species sought (n > 1) while fishing the Missouri River during 2005.

Microhabitat	Shovelnose sturgeon	Common carp	Catfish	Channel catfish	Flathead catfish	Freshwater drum	Any species	Total
Number of anglers	11	15	211	38	77	2	280	634
Tributary above			2.4				3.6	2.4
Tributary mouth		13.3	3.3		6.5		6.8	5.2
Tributary upper bank			3.3				1.8	1.9
Tributary lower bank			0.5				0.7	0.5
Tributary below		13.3	2.8					1.3
Tributaries total		26.6	12.3		6.5		12.9	11.3
Channel bank cutting	81.8	20.0	30.8	26.3	23.4	100	22.1	26.6
Channel bank filling							0.7	0.3
Wing dike upper dike		13.3	1.0		7.8		5.7	4.1
Wing dike hole	9.1		3.8		5.2		2.5	3.1
Wing dike inner hole		6.7	10.4	5.3	11.7		13.6	11.6
Wing dike point bar	9.1	6.7	14.2	10.5	9.1		18.2	14.7
Wing dike total	18.2	26.7	29.4	15.8	33.8		40.0	33.5
Notched dike upper dike			1.4				0.4	0.6
Notched dike hole			1.0					0.3
Notched dike inner hole		6.7	5.2	7.9	5.2		1.8	3.9
Notched dike point bar							0.4	0.2
Notch dike notch								0.0
Notched dike total		6.7	7.6	7.9	5.2		2.6	5.0
Chevron riverside								0.0

Microhabitat	Shovelnose sturgeon	Common carp	Catfish	Channel catfish	Flathead catfish	Freshwater drum	Any species	Total
Chevron bankside								0.0
Chevron below		6.7	1.4		1.3			0.8
Chevron total		6.7	1.4		1.3			0.8
Revetment scallop above			1.0	2.6	2.6		0.4	0.9
Revetment scallop mouth			0.5	10.5	3.9		0.7	1.6
Revetment scallop upper pool		6.7	2.4	10.5	10.4		8.9	6.9
Revetment scallop lower pool			1.4				1.1	0.9
Revetment scallop below		6.7	4.7	10.5	2.6		1.1	3.1
Revetment scallop total		13.4	10.0	34.1	19.5		12.2	13.4
Chute entrance								0.0
Chute exit								0.0
Chute total								0.0
Kicker outside dike							2.1	0.9
Kicker inside dike			6.2	10.5	10.4		6.4	6.7
Kicker hole			2.4	5.3			1.1	1.6
Kicker total			8.6	15.8	10.4		9.6	9.2

Table 29. Percent of fish caught by anglers by species by microhabitat while fishing the Missouri River during 2005

Microhabitat	Pallid Sturgeon	Shovelnose sturgeon	Gar family	Goldeye	Common carp	Silver carp	Smallmouth buffalo	Yellow bullhead	Blue catfish	Channel catfish	Flathead catfish	White bass	Sauger	Freshwater drum	Percent
Number of fish	1	44	2	4	44	1	1	2	1	58	101	1	3	59	322
Tributary above		2.3			2.3					1.7	1.0	100		5.1	2.5
Tributary mouth				25.0	11.4					1.7	2.0			1.7	3.1
Tributary upper bank										1.7	1.0			3.4	1.2
Tributary lower bank															0.0
Tributary below											3.0		66.7		1.6
Tributaries total		2.3		25.0	13.7					5.1	7.0	100	66.7	10.2	8.4
Channel bank cutting		31.8	50.0		34.1					22.4	17.8			18.6	22.6
Channel bank filling															0.0
Wing dike upper dike		2.3			6.8					3.5	1.0			1.7	2.5
Wing dike hole		9.1			2.3					1.7	5.9			1.7	4.0
Wing dike inner hole		9.1			22.7				100	17.2	11.9		33.3	3.4	12.4
Wing dike point bar		25.0			13.6	100				10.3	16.8			23.7	17.0
Wing dike total		45.5			45.4	100			100	32.7	35.6		33.3	30.5	35.9
Notched dike upper dike											1.0			1.7	0.6
Notched dike hole											2.0				0.6
Notched dike inner hole											3.0				0.9
Notched dike point bar														1.7	0.3
Notch dike notch															0.0
Notched dike total											6.0			3.4	2.4

Microhabitat	Pallid Sturgeon	Shovelnose sturgeon	Gar family	Goldeye	Common carp	Silver carp	Smallmouth buffalo	Yellow bullhead	Blue catfish	Channel catfish	Flathead catfish	White bass	Sauger	Freshwater drum	Percent
Chevron riverside															0.0
Chevron bankside															0.0
Chevron below					4.6					5.2	1.0			3.4	2.5
Chevron total					4.6					5.2	1.0			3.4	2.5
Revetment scallop above										1.7	2.0				0.9
Revetment scallop point										5.2	1.0				1.2
Revetment scallop upper pool		18.2		75.0			100	100		6.9	10.9			18.6	12.4
Revetment scallop lower pool															0.0
Revetment scallop below										5.2	5.0			3.4	3.1
Revetment scallop total		18.2		75.0			100	100		19.0	18.9			22.0	17.6
Chute entrance															0.0
Chute exit															0.0
Chute total															0.0
Kicker outside dike															
Kicker inside dike		2.3	50.0		2.3					8.6	11.9			5.1	7.1
Kicker hole	100									6.9	2.0			6.8	3.4
Kicker total	100	2.3	50.0		2.3					15.5	13.9			11.9	10.5

Table 30. Percent of anglers seeking fish species by access type while fishing the Missouri River during 2005.

Species	Access	
	Bank	Boat
Number of Anglers	303	336
Shovelnose sturgeon	3.6	
"Skipjack"		0.3
Grass carp		0.3
Common carp	0.7	3.9
Bighead carp		0.3
Buffalo		0.3
Catfish	25.4	39.9
Channel catfish	4.3	7.4
Flathead catfish	7.6	16.1
Bluegill		0.3
Freshwater drum		0.6
Any species	58.4	30.7

Table 31. Percent of fish caught by access type while fishing the Missouri River during 2005.

Species	Access	
	Bank	Boat
Number of Fish	141	181
Pallid sturgeon		0.6
Shovelnose sturgeon	27.7	2.8
Gar family		1.1
Goldeye	0.7	1.7
Common carp	15.6	12.1
Silver carp	0.7	
Smallmouth buffalo	0.7	
Yellow bullhead	1.4	
Blue catfish		0.6
Channel catfish	9.9	24.2
Flathead catfish	19.9	40.1
White bass	0.7	
Sauger	1.4	0.6
Freshwater drum	21.3	15.9

Table 32. Percent of bank and boat anglers by macrohabitat that fished the Missouri River during 2005.

Macrohabitat	Access	
	Bank	Boat
Number of Anglers	303	336
Tributaries total	15.2	4.8
Upper inside bend	5.9	8.0
Middle inside bend	35.3	24.1
Lower inside bend	7.9	14.9
Inside bend total	49.1	47.0
Upper outside bend	5.6	7.7
Middle outside bend	17.8	19.9
Lower outside bend	9.6	20.5
Outside bend total	33.0	48.1
Upper secondary channel	0.3	
Middle secondary channel		
Lower secondary channel	1.7	
Secondary channel total	2.0	0.0
Secondary channel non-connected	0.7	

Table 33. Percent of bank and boat anglers by microhabitat that fished the Missouri River during 2005.

Microhabitat	Bank	Boat
Number of anglers	303	336
Tributary above	3.3	1.5
Tributary mouth	7.9	2.7
Tributary upper bank	3.6	0.3
Tributary lower bank	1.0	
Tributary below	1.3	1.2
Tributaries total	17.1	5.7
Channel bank cutting	22.4	30.4
Channel bank filling	0.7	0.0
Wing dike upper dike	6.9	1.5
Wing dike hole	4.3	2.1
Wing dike inner hole	8.9	14.0
Wing dike point bar	18.8	11.0
Wing dike total	38.9	28.6
Notched dike upper dike	0.3	0.9
Notched dike hole		0.6
Notched dike inner hole	1.7	6.0
Notched dike point bar	0.3	
Notched dike total	2.3	7.5
Chevron riverside		
Chevron bankside		
Chevron below		1.5
Chevron total	0.0	1.5
Revetment scallop above	1.3	0.6
Revetment scallop point	1.3	1.8
Revetment scallop upper pool	8.3	5.7
Revetment scallop lower pool	1.3	0.6
Revetment scallop below	4.3	2.1
Revetment scallop total	16.5	10.8
Chute entrance		
Chute exit		
Chute total	0.0	0.0
Kicker outside dike		1.8
Kicker inside dike	1.7	11.3
Kicker hole	0.3	2.7
Kicker total	2.0	15.8

Figure 3. Water temperature (°C) readings from the Missouri River during 2005.

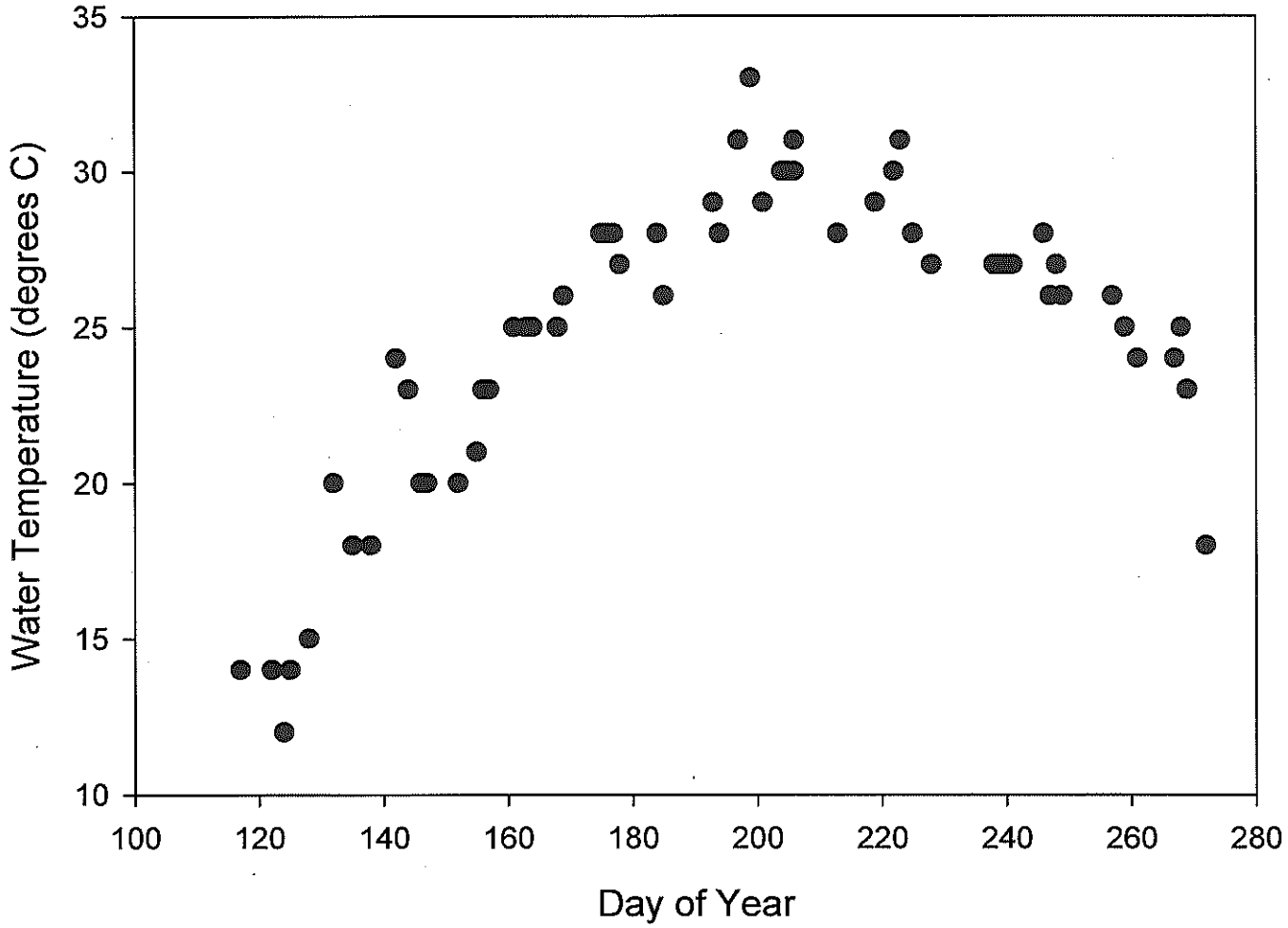


Figure 4. Secchi disk transparency (mm) readings from the Missouri River during 2005.

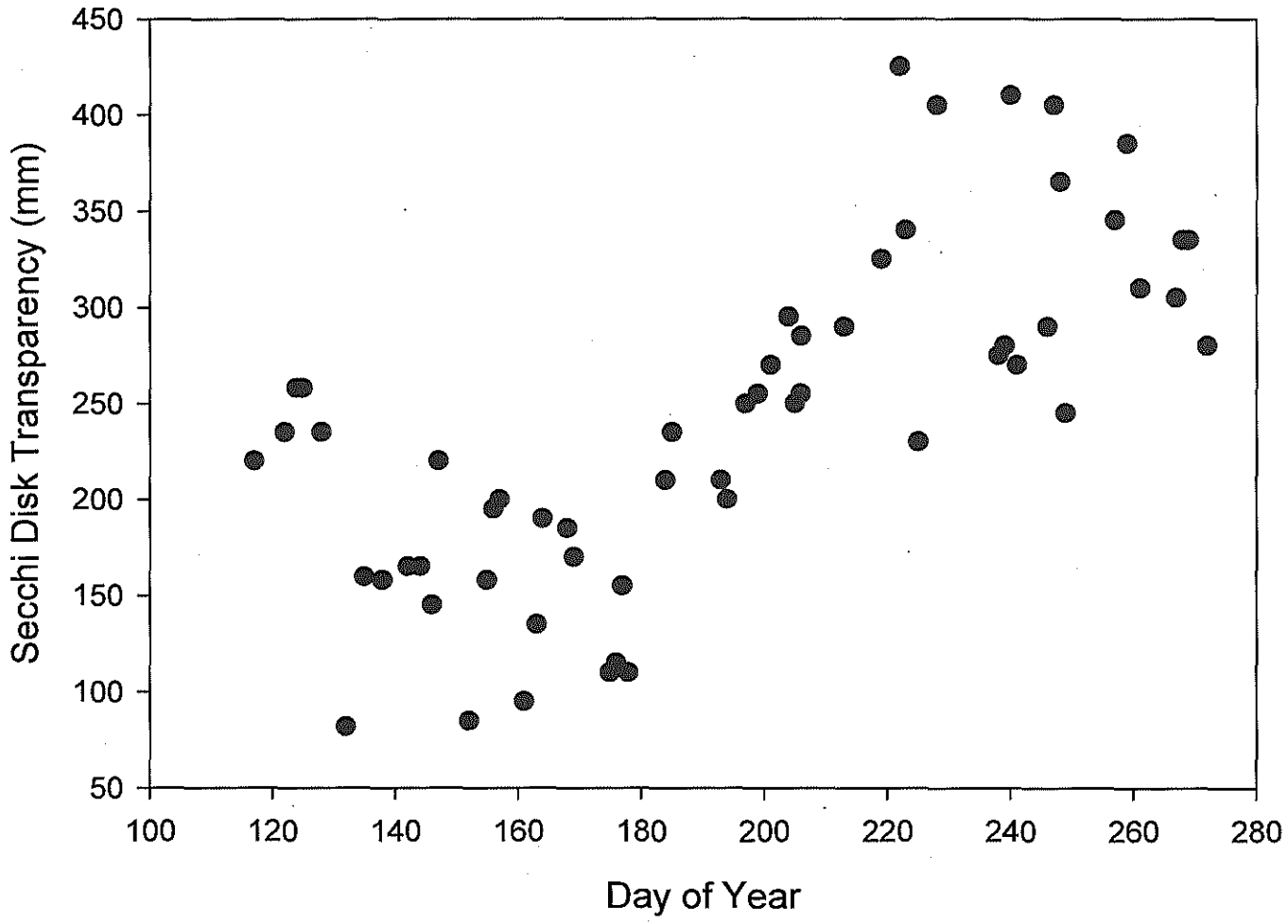


Table 34. Percent of anglers seeking a species by range of water temperature from the Missouri River during 2005.

Species	Water Temperature (°C)					Number of anglers
	0 - 10	11 -15	16 - 20	21 - 25	26 - 30	
Number of anglers		27	52	174	386	639
Percent of anglers		4.2	8.1	27.2	60.4	
Shovelnose sturgeon		27.3	9.1	63.6		1.7
"Skipjack"					100	0.2
Grass carp					100	0.2
Common carp			6.7	40.0	53.3	2.4
Bighead carp				100		0.2
Buffalo			100			0.2
Catfish		2.4	9.0	16.1	72.5	33.0
Channel catfish				13.2	86.8	5.6
Flathead catfish		1.3		42.9	55.8	12.1
Bluegill					100	0.2
Freshwater drum		100				0.3
Any species		5.7	10.7	31.4	52.1	43.8

Table 35. Percent of species catch by range of water temperature for anglers fishing the Missouri River during 2005.

Species					Number of fish
	11 -15	16 - 20	21 - 25	26 - 30	
Number of fish	23	29	94	177	323
Percent of fish	7.1	9.0	29.1	54.8	
Pallid sturgeon			100		1
Shovelnose sturgeon	25.0	30.0	27.3	18.2	44
Gar family			50.0	50.0	2
Goldeye	25.0		75.0		4
Common carp	4.6		6.8	88.6	44
Silver carp	100				1
Smallmouth buffalo			100		1
Yellow bullhead			100		2
Blue catfish				100	1
Channel catfish	3.5	5.2	27.6	63.8	58
Flathead catfish	1.0	10.8	38.2	50.0	102
White bass			100		1
Sauger				100	3
Freshwater drum	8.5	3.4	25.4	62.7	59

Table 36. Percent of anglers seeking a species by range of water transparency (cm) from the Missouri River during 2005.

Species	Secchi disk depth (cm)						Number of anglers
	1 - 10	11 - 20	21 - 30	31 - 40	41 - 50	51-60	
Number of anglers	1	169	266	124	70	9	639
Percent of anglers	< 0.1	26.4	41.6	19.4	11.0	1.4	
Shovelnose sturgeon		72.7	27.3				11
"Skipjack"				100			1
Grass carp					100		1
Common carp		6.7	46.7	40.0		6.7	15
Bighead carp		100					1
Buffalo						100	1
Catfish		10.0	52.1	17.5	19.0	1.4	211
Channel catfish		60.5	39.5				38
Flathead catfish		9.1	39.0	45.5	6.5		77
Bluegill				100			1
Freshwater drum			100				2
Any species	0.4	38.6	35.4	15.7	8.6	1.4	280

Table 37. Percent of species catch by range of water transparency (cm) for anglers fishing the Missouri River during 2005.

Species	11 - 20	21 - 30	31 - 40	41 - 50	Number of fish
Number of fish	83	143	73	24	323
Percent of fish	25.7	44.3	22.6	7.4	
Pallid sturgeon	100				1
Shovelnose sturgeon	65.9	27.3	6.8		44
Gar family	50.0	50.0			2
Goldeye		25.0	75.0		4
Common carp	2.3	65.9	9.1	22.7	44
Silver carp		100			1
Smallmouth buffalo			100		1
Yellow bullhead	50.0		50.0		2
Blue catfish			100		1
Channel catfish	29.3	43.1	17.2	10.3	58
Flathead catfish	13.7	43.1	39.2	3.9	102
White bass			100		1
Sauger				100	3
Freshwater drum	32.2	50.9	15.3	1.7	59

Other Angler Information

Male anglers outnumbered female anglers by five to one during the survey (Table 38). Only 9.5% of the anglers were less than 16 years of age while 13.8% of the anglers were over 60 years of age. All anglers interviewed during the creel survey were from Nebraska (68.9%) or Iowa (31.1%) (Table 39). Over 98% of the anglers were bait fishing. Only 1.4% of the anglers interviewed were actively running set lines when they were interviewed but 18.9% said they had run set lines at some time during 2005.

Table 38. Gender and age of anglers fishing the Missouri River during 2005.

	Frequency	Percent
Sex		
Male	535	84.7
Female	97	15.4
Missing	17	
Age		
0 - 5	5	0.8
6 - 10	15	2.4
11 - 15	40	6.3
16 - 20	25	4.0
21 - 25	29	4.6
26 - 30	58	9.2
31 - 35	59	9.3
36 - 40	64	10.1
41 - 45	72	11.4
46 - 50	80	12.7
51 - 55	51	8.1
56 - 60	47	7.4
61 - 65	43	6.8
66 - 70	30	4.8
71 - 75	7	1.1
76 - 80	4	0.6
> 80	3	0.5
Missing	11	

Table 39. State of residence, angling method, and set lining use for anglers fishing the Missouri River during 2005.

Demographic	Number	Percent
State of Residence		
Nebraska	440	68.9
Iowa	199	31.1
Missing	10	
Angling method		
Bait Fishing	624	98.1
Drifting	2	0.3
Set Lining	9	1.4
Archery	1	0.2
Missing	13	
Have you ran set lines this year?		
Yes	119	18.9
No	512	81.1
Missing	18	

Discussion

No changes were made in the design of the creel survey used during 2005

In Table 40 we compare selected parameters from the 2000, 2002, 2004 and 2005 creel surveys of the Missouri River from Bellevue to Camp Creek and the 2001 and 2003 creel surveys from Camp Creek to Kansas State line. Creel period one was missed in 2005 due to lack of personnel. Total effort in 2005 appeared to be down significantly during the early part of the year (periods 1-3) even accounting for missing period one. Fishing effort was actually slightly higher during the later part of the year (periods 4-7) than in 2000 and 2002. The percent of weekend hours fished in the Bellevue to Camp Creek segment increased in 2005 to 63.4%, the highest reported for this segment.

In 2005, only 1.1% of anglers were seeking shovelnose sturgeon as compared to 3.1% of anglers in this segment in 2000 and 2.4% in 2002 (Table 40). The percent of anglers seeking "catfish" in 2005 (51.5%) was about the same as seen in 2000 (53.7%) and 2002 (46.4%). This was consistently lower than was seen in 2001 and 2003 in the Camp Creek to Kansas State Line reach. Even while accounting for missing period one, total catch was down dramatically in 2005. Catch, harvest and release rates were the lowest ever reported, with the exception of the shortened creel in 2004. The percent of shovelnose sturgeon and freshwater drum in the catch from the Bellevue to Camp Creek segment was similar to that seen in 2000 and 2002, while the percent of common carp and channel catfish was lower. The percent of flathead catfish in the catch increased dramatically when compared to 2000 and 2002 and in fact was the highest ever reported. Similar trends were seen in catch rates for these species. The quality of channel catfish caught by anglers in the Bellevue to Camp Creek segment in 2005 was actually slightly higher than in 2000 and 2002 while the quality of flathead catfish decreased. Even though more than 68% of the anglers surveyed in 2005 were Nebraska residents this is the lowest percentage ever reported. The number of anglers surveyed in 2005 that had run setlines was 18.9% which was the highest ever reported.

Differences were seen between the two river reaches (Table 40). Anglers are more generalists in the Bellevue to Camp Creek reach when compared to the Camp Creek to Kansas State Line reach. Total catch in the Bellevue to Camp Creek reach in 2005 was comparable to what we had seen in the Camp Creek to Kansas State Line reach. Shovelnose sturgeon and freshwater drum are more abundant in the creel from the Bellevue to Camp Creek reach.

Past creel surveys conducted on the river are summarized and compared to the present survey in Table 41. The number of fish harvested was standardized to number of fish per hectare. A standard surface area of 24.1 hectares per kilometer (96 acres per mile) (Morris et al. 1968) was used to standardize the present survey and the surveys conducted in 1972-1973 (Groen 1973) and 1978-1979 (Hesse 1980).

Fishing effort per hectare (14.4 hours) during 2005 was down for this segment when compared to 2000 (27.1) and 2002 (20.9) (Table 41). Overall catch rate (harvest) during 2005 (0.11 fish per hour) was the lowest reported since we started this creel in 2000. The total number of fish harvested per hectare of water from this reach (1.69) was below the mean for all surveys (4.09). The number of sturgeon harvested in 2005 (0.30 per hectare) was down from 2000 (0.57 per hectare) and 2002 (0.83 per hectare). This may be in part due to missing the first creel period. The number of common carp harvested in 2005 (0.80 per hectare) was down slightly from 2000 (1.02 per hectare) and 2002 (1.03 per hectare). Channel catfish harvest was down by almost 75% in 2005 (0.32 per hectare) when compared to 2002 (1.29 per hectare) and was lower than the average reported for the Missouri River (1.09 per hectare). Flathead catfish harvest during 2002 (0.79 per hectare) was up from 2000 and 2002 and the third highest harvest rate reported for the Missouri River. The number of freshwater drum harvested in 2005 (0.14 per hectare) was one of the lowest ever reported.

Table 40. Comparison of selected parameters between the 2000 through 2005 Missouri River creel surveys.

Parameter	Bellevue to Camp Creek				Camp Creek to Kansas State Line	
	2000	2002	2004 Missed Periods 3-7	2005 Missed Period 1	2001	2003
Number of creel periods (days)	6 (168)	7 (196)	2 (56)	6(168)	7 (196)	7 (196)
Effort (hours)	55,047	42,367	6,499	29,257	22,131	30,187
Effort (hours) creel periods 1 - 3	36,857	17,634	6,499	8,890	5,137	12,455
Effort (hours) creel periods 4 - 6	18,190	19,969	0	20,089	15,706	17,731
Percent weekend hours	53.5%	53.8%	55.1%	63.4%	69.0%	62.8%
Percent of total effort fishing for						
Shovelnose sturgeon	3.1%	2.4%	0%	1.1%	0%	0%
Common carp	2.2%	3.4%	0%	2.6%	1.4%	1.2%
Channel catfish	9.1%	23.7%	88.6%	4.9%	9.2%	21.2%
Flathead catfish	15.0%	21.7%	11.4%	12.2%	24.1%	21.4%
All "catfish"	53.7%	46.4%	100%	51.5%	77.8%	70.9%
Freshwater drum	1.7%	0%	0%	0.4%	0%	0%
Any species	39.2%	47.3%	0%	55.4%	20.9%	27.8%
Total catch	23,853	18,636	1,074	7,840	8,151	12,778
Harvested fish	9,139	7,812	1,049	3,430	4,022	6,088
Released fish	14,714	10,824	26	4,412	4,129	6,689
Percent released fish	61.7%	58.1%	2.4%	56.3%	51%	52.3
Catch rate	0.44	0.39	0.18	0.25	0.37	0.38
Harvest rate	0.17	0.17	0.17	0.11	0.18	0.18
Release rate	0.27	0.22	0.01	0.14	0.19	0.20
Percent of total catch						
Shovelnose sturgeon	12.4%	14.7%	1.2%	13.5%	9.1%	0.7%
Common carp	21.3%	19.4%	0%	7.4%	9.7%	9.8%
Channel catfish	25.9%	38.6%	74.6%	15.6%	38.8%	67.9%
Flathead catfish	9.0%	4.7%	0.9%	40.1%	26.1%	9.3%
Freshwater drum	21.0%	14.7%	0%	17.7%	3.4%	6.3%

Table 40. Continued.

Parameter	Bellevue to Camp Creek				Camp Creek to Kansas State Line	
	2000	2002	2004 Missed Periods 3-7	2005 Missed Period 1	2001	2003
Catch rate (fish / hour)						
Shovelnose sturgeon	0.05	0.07	< 0.01	0.04	0.03	< 0.01
Common carp	0.09	0.05	0	0.03	0.04	0.03
Channel catfish	0.11	0.15	0.13	0.04	0.14	0.24
Flathead catfish	0.04	0.02	< 0.01	0.08	0.10	0.05
Freshwater drum	0.09	0.06	0	0.05	0.01	0.03
RSD-preferred						
RSD-preferred channel catfish	4	2	0	6	3	0
RSD-preferred flathead catfish	10	23	0	7	1	0
Percent of Nebraska residents	71.5%	78.2%	85.7%	68.9%	44.1%	48.4
Percent of anglers that ran setlines	8.5%	2.5%	0%	18.9%	16.0%	8.7

Table 41. Comparison between Missouri River creel studies.

Year	2005 Present Study	2004	2003	2002	2001	2000	1972 - 1973	1972 - 1973	1978- 1979	1985 - 1986	1984 - 1985	1983 - 1984	1986 - 1987
Creel period	4/2 - 10/14	4/3 - 5/29	3/29 - 10/10	3/30 - 10/11	3/31 - 10/12	4/1 - 9/15	7/1 - 8/3 5/1 - 6/30	7/1 - 10/31 5/1 - 6/30	3/1 - 1/31	8/25 - 8/23	8/26 - 8/24	8/28 - 8/25	8/24 - 8/22
Study	Mestl 2006	Mestl 2005	Mestl 2004	Mestl 2003	Mestl 2002	Mestl 2001	Groen 1973	Groen 1973	Hesse 1980	Fleener 1989	Fleener 1989	Fleener 1989	Fleener 1989
River kilometers	883.5 - 967.7	883.5 - 967.7	788.3 - 883.5	883.5 - 967.7	788.3 - 883.5	883.5 - 967.7	803.2 - 906.1	906.1 - 1045.6	790.0 - 1,183.9	682.3 - 891.9	419.4 - 682.3	232.3 - 419.4	0 - 232.3
Length (km)	84.2	84.2	95.3	84.2	95.3	84.2	102.9	139.5	393.9	207.9	262.9	187.1	232.3
Creel type	Roving	Roving	Roving	Roving	Roving	Roving	Roving/ Access	Roving / Access	Roving	Access	Access	Access	Access
Creel hours	Daylight	Daylight	Daylight	Daylight	Daylight	Daylight	Daylight	Daylight	Daylight	24 hours	24 hours	24 hours	24 hours
Number of fish harvested per hectare of water													
Paddlefish								0.03			0.04	<0.01	<0.01
Sturgeon	0.30	<0.01		0.83	0.03	0.57			0.08	0.19	0.32	0.05	0.05
Longnose gar					0.02								
Shortnose gar					<0.01	0.02							
Gizzard shad									0.01				
Goldeye	0.04			0.06		0.04	0.18	0.13	0.06				
Common carp	0.8		0.34	1.03	0.18	1.02	0.76	1.86	0.51	0.76	1.46	0.29	0.16
Grass carp					<0.01	<0.01					0.01	<0.01	
Carp sucker				0.02	0.02			0.05			<0.01	0.01	0.01

Table 41. Continued.

Year	2005 Present Study	2004	2003	2002	2001	2000	1972 - 1973	1972 - 1973	1978- 1979	1985 - 1986	1984 - 1985	1983 - 1984	1986 - 1987
Buffalo	<0.01			0.01		0.01		0.10		<0.01	0.11	0.10	0.02
Shorthead redhorse		0.11						0.03					
Black bullhead							0.13	0.76	0.41				
Blue catfish			0.12		<0.01	0.03				0.04	0.07	0.24	0.14
Channel catfish	0.32	0.39	1.69	1.29	0.90	1.22	0.18	2.26	0.20	0.58	1.89	1.94	0.64
Flathead catfish	0.79	<0.01	0.46	0.13	0.55	0.46	0.22	0.05	0.11	0.95	1.42	0.68	0.31
Stonecat								0.05					
Northern pike								0.03					
Burbot								0.05					
White bass						0.01	0.09	0.05	0.03				
Largemouth bass									0.01		0.10	0.05	0.12
Bluegill											0.02	0.18	0.35
Crappie								0.62	0.06		2.31	0.85	0.64
Sauger						0.02	0.13	0.13	0.16				
Walleye						0.01			0.03	<0.01	0.02		0.02
Freshwater drum	0.14		0.04	0.48	<0.01	1.01	0.13	0.89	0.42	0.34	2.28	0.98	0.74

Table 41. Continued.

Year	2005 Present Study	2004	2003	2002	2001	2000	1972 - 1973	1972 - 1973	1978- 1979	1985 - 1986	1984 - 1985	1983 - 1984	1986 - 1987
Other fish		<0.01							0.22	0.07	1.73	0.30	0.17
Total fish	1.69	0.53	2.65	3.85	1.75	4.50	1.88	6.93	2.07	2.92	11.77	5.68	3.36
Total hours	29,257	6,499	30,187	42,367	22,131	55,047	22,716	95,335	106,478	42,490	155,330	84,960	61,050
Fish per hour	0.11	0.17	0.18	0.17	0.18	0.17	0.21	0.24	0.20	0.20	0.44	0.31	0.34
Hectares of water	2,029	2,029	2,297	2,029	2,297	2,029	2,534	3,304	9,491	4,616	7,345	6,051	9,549
Hours per hectare	14.4	3.2	13.1	20.9	9.6	27.1	9.0	28.9	11.2	9.2	21.0	14.0	6.4

Acknowledgment

This work could not have been done without the dedication and assistance the 2005 creel clerks; Ken Hatten and Walter Belding. Ken and Ben Parnell also assisted with data entry and data verification and with creating tables and editing this report.

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Appendix I - Missouri River Creel Survey Forms

Nebraska Game and Parks Commission
Fisheries Division

Missouri River Creel Survey - Count Form

(33-000 / REV 3-02)

Enter the segment code and the time you finish counting that segment.

Direction
1 - Upriver
2 - Downriver

MONTH	DAY	YEAR	CLERK
		2002	

	SEGMENT	COUNT END TIME	DIR
1	1111		
2			
3			
4			
5			
6			
7	9999		

ANGLER - RECREATIONAL COUNT

	BANK-NE	BANK-IA/MO	BOAT	OTHER
1				
2				
3				
4				
5				
6				
7				

BOAT COUNT

	FISHING	REC	JET SKI
1			
2			
3			
4			
5			
6			
7			

TEMPERATURE (C), WEATHER AND RIVER CONDITONS

	AIR	WATER	WIND	WEATHER	NAVIGATION	SECCHI (cm)
1						
2						
3						
4						
5						
6						
7						

Wind
- 00 - Calm <1
- 01 - Light air 1-3
- 02 - Light breeze 4-7
- 03 - Gentle breeze 8-12
- 04 - Mod breeze 13-18
- 05 - Fresh breeze 19-24
- 06 - Strong breeze 25-31
- 07 - Mod gale 32-38
- 08 - Fresh gale 39-46

Weather
- 01 - No effect
- 02 - Lightning
- 03 - Precipatation

Navigation
- 01 - No debris
- 02 - Some debris
- 03 - Heavy debris
- 04 - Ice

Segments

8390 - Bellevue Br - Platte River
601.3 - 595
8410 - Platte River - Rock Bluff
595 - 584.5
8420 - Rock Bluff - Weeping Water Cr
584.5 - 568.6
8430 - Weeping Water Cr - OPPD
568.6 - 556.3
8440 - OPPD - Camp Cr
556.3 - 549

COMMENTS _____

RAW DAILY COUNTS

Bank Anglers - Nebraska Bank - persons actively fishing	
Bank Anglers - Iowa - persons actively fishing	
Boat Anglers - persons actively fishing	
Recreational Activity - sunbathers, boaters birdwatchers, picnicers	

Fishing Boats	
Recreational Boats	
Jet Skiis	

Nebraska Game and Parks Commission
Fisheries Division

Missouri River Creel Survey - Survey Form

(33-000 / REV 3-02)

PAGE ____ OF ____

Sex
1 - Male
2 - Female
Trip
1 - Complete
2 - Incomplete
Setline
1 - Yes
2 - No

Method
01 - Bait fishing
02 - Casting
03 - Drifting
04 - Setlining
05 - Trotlining
06 - Archery
07 - Snagging
08 - Jug fishing

MONTH ____ DAY ____ YEAR 2002 CLERK ____

Bank
1 - NE bank anglor
2 - IA/MO bank anglor
3 - NE boat anglor
4 - IA/MO boat anglor

ACCESS CODE
(BANK OR BOAT)
3333 - PRIVATE PROPERTY
4444 - PRIVATE BOAT RAMP

	SEGMENT	PARTY #	ANGLER #	FISHING LICENSE #	STATE	AGE	SEX	START TIME	INTERVIEW TIME	TRIP
1										1
2										2
3										3
4										4
5										5
6										6
7										7
8										8
9										9
10										10

	SPECIES SOUGHT	METHOD	BAIT	MACRO	MICRO	Structure	Latitude "40°"	Longitude "95°"	BANK	ACCESS CODE (where fishing?)	BOAT RAMP Launched	SETLINE
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

	SEGMENT	PARTY #	ANGLER #	FISHING LICENSE #	STATE	AGE	SEX	START TIME	INTERVIEW TIME	TRIP	
11											11
12											12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20

	SPECIES SOUGHT	METHOD	BAIT	MACRO	MICRO	Structure	Latitude "40°"	Longitude "95°"	BANK	ACCESS CODE (where fishing?)	BOAT RAMP Launched	SETLINE
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

COMMENTS _____

			HARVEST				RELEASE			
	ANGLER #	SPECIES	LENGTH (mm)	WEIGHT (g)	GROUP (inches)	COUNT	TAG	
1								1
2								2
3								3
4								4
5								5
6								6
7								7
8								8
9								9
10								10
11								11
12								12
13								13
14								14
15								15
16								16
17								17
18								18
19								19
20								20
21								21
22								22
23								23
24								24
25								25
26								26
27								27
28								28
29								29
30								30

	TAG	TAG NUMBER	COMMENTS
1			
2			
3			
4			
5			

Nebraska Game and Parks Commission
Fisheries Division

PAGE ____ OF ____

Missouri River Creel Survey - Creel Form

(33-000 / REV 3-02)

Remember to record a line of data for each angler even if they don't have any fish.
999 - NO FISH

MONTH ____ DAY ____ YEAR 2002 CLERK ____

	ANGLER #		SPECIES			HARVEST LENGTH (mm)				HARVEST WEIGHT (g)					RELEASE GROUP (inches)			RELEASE COUNT		TAG	
1																					1
2																					2
3																					3
4																					4
5																					5
6																					6
7																					7
8																					8
9																					9
10																					10
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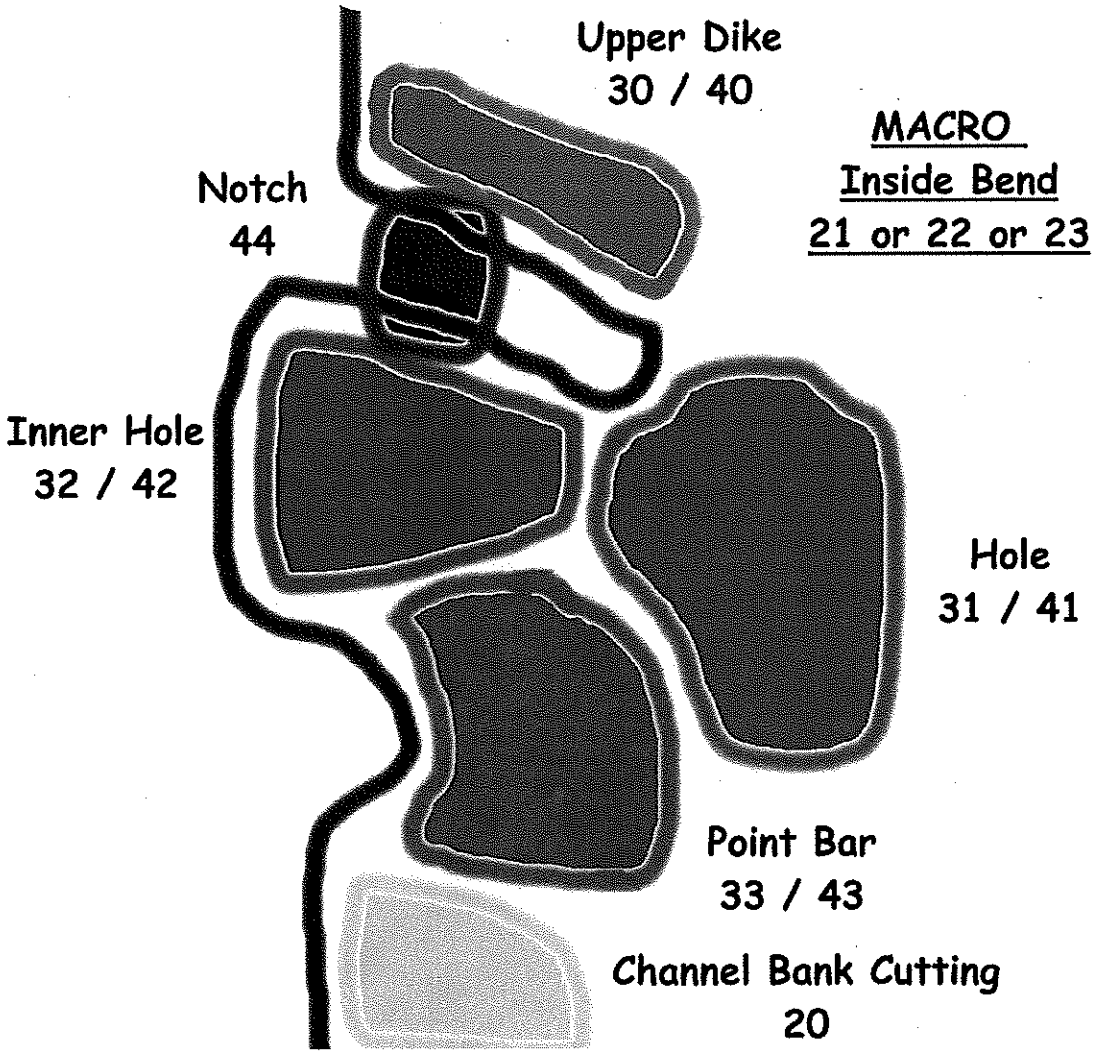
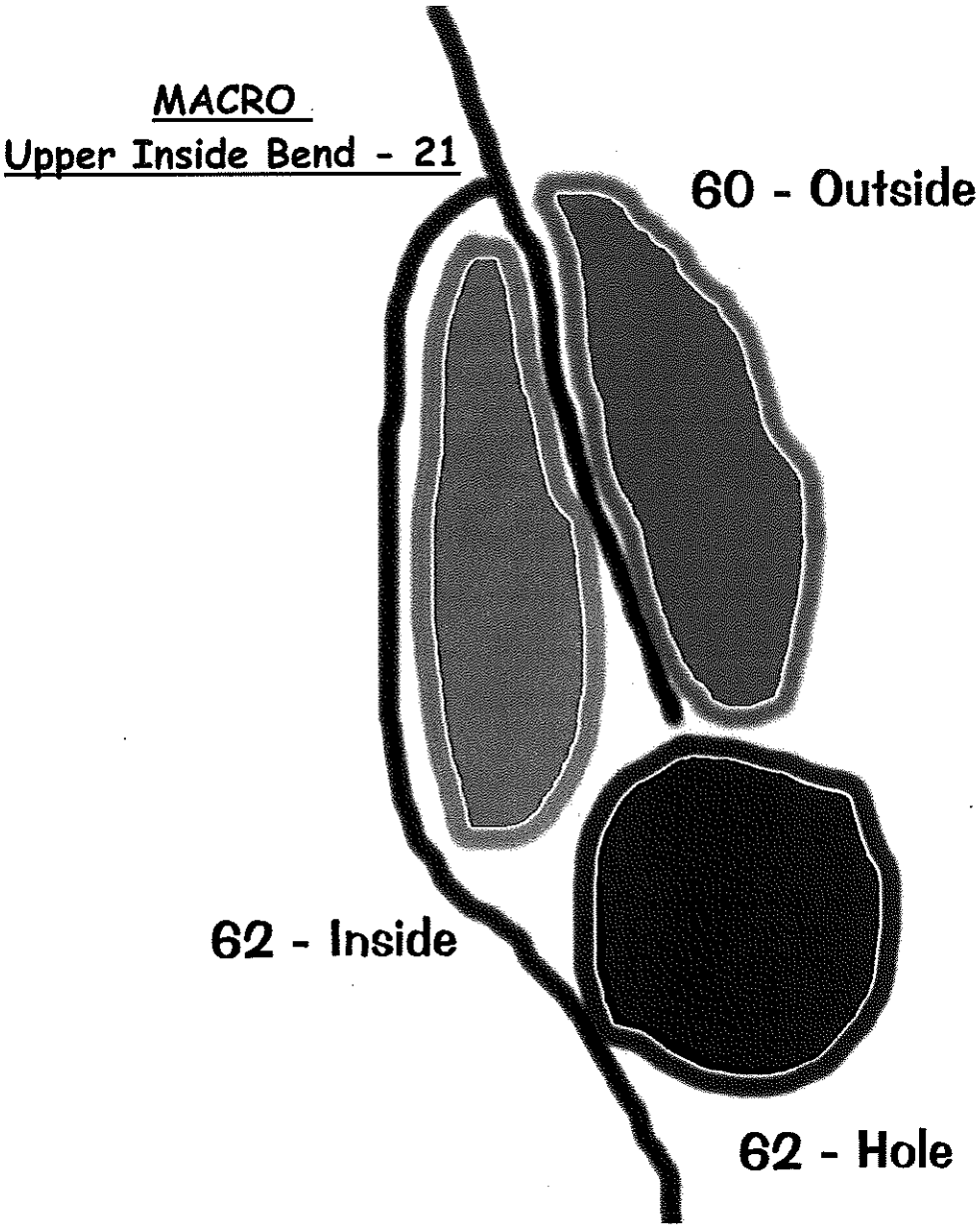
23																					23
24																					24
25																					25
26																					26
27																					27
28																					28
29																					29
30																					30

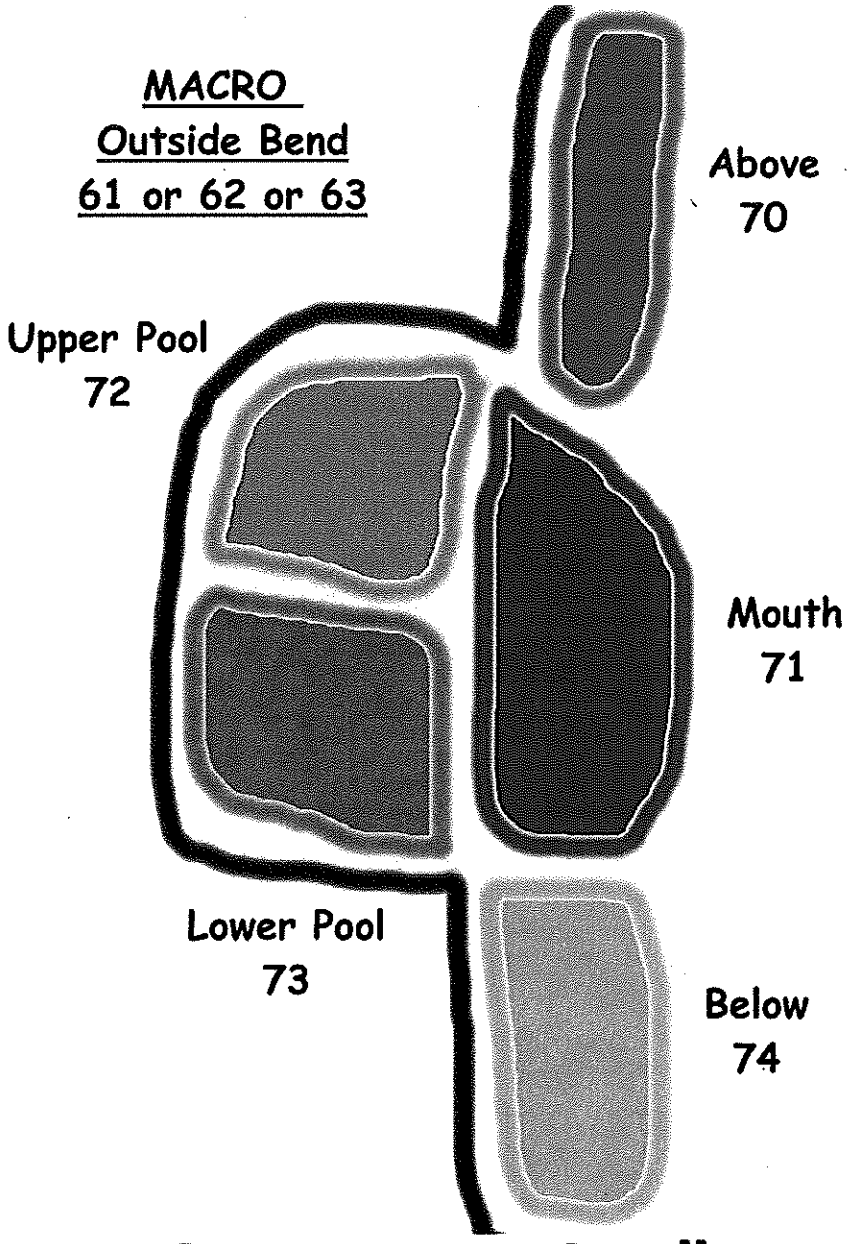
Appendix II - Diagrams of Macrohabitats and Microhabitats Used During the Creel Survey



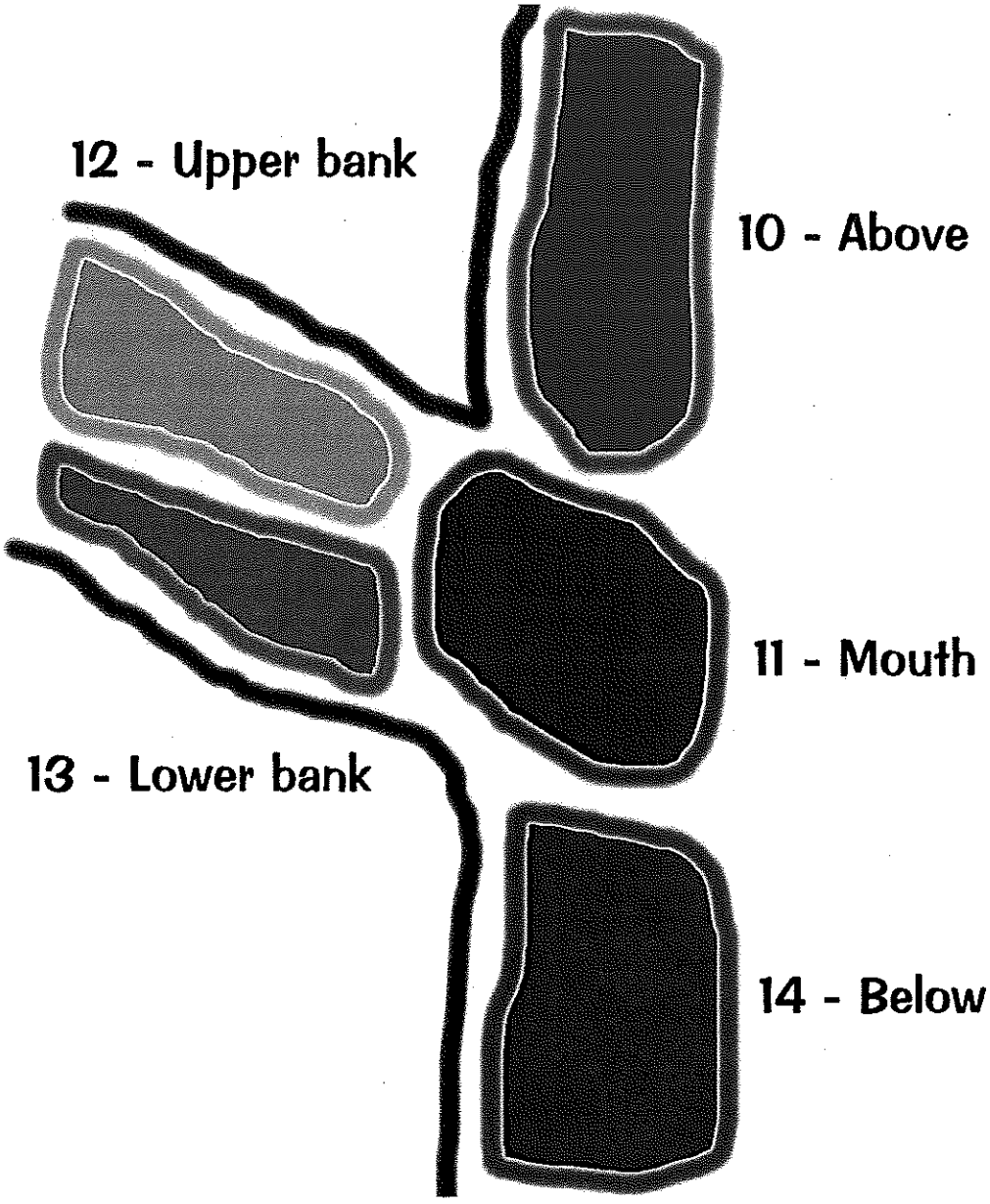
Wing dike / notched dike Fishing Location Codes



Kicker (l-head) Revetment Fishing Location Codes



Revetment Scallop Fishing Location Codes



Tributary / Ditch Mouth Fishing Location Codes